Biological Assessment for Programmatic Forest Service and Bureau of Land Management Activities in Northwestern Oregon

Spawning bull trout. Photos by Ray Rivera, Willamette National Forest.

May 2, 2008

Biological Assessment for Programmatic Forest Service and Bureau of Land Management Activities in Northwestern Oregon

Prepared and Reviewed by:
Salem District Bureau of Land Management
Eugene District Bureau of Land Management
Mt. Hood National Forest
Willamette National Forest
Columbia River Gorge National Scenic Area
Siuslaw National Forest

Prepared for Consultation with:
National Marine Fisheries Service
U.S. Fish and Wildlife Service

Table of Contents

List of Figures and Tables

Figures

Tables

Chapter I - Introduction

The NW Oregon Level 1 Fisheries Team, referred to as the Level 1 Team, has developed an approach to describe and evaluate the effects of programmatic activity categories that occur within the range of fish species listed under the Endangered Species Act (ESA) of 1973, as amended. This approach was first described in a Biological Assessment (BA) developed in 1997 by the Level 1 Team, then refined in an updated BA produced in 2002. The National Marine Fisheries Service (NMFS) and Fish and Wildlife Service (USFWS) issued Biological Opinions in 2003 (NMFS 2002/01254 and 2002/01880 and USFWS Log no. 1-7-03-F-20), which expired September 30, 2007. Most of the restoration activities within the 2002 BA are now covered in the regional aquatic restoration activities biological opinions issued by NMFS (April 28, 2007; P/NWR/2006/06530, P/NWR/2006/06532) and USFWS (June 14, 2007; 13420-2007-F-0055). This document updates the 2002 programmatic by describing ongoing and routine land management projects with a routine and predictable effect to ESA listed species.

This BA includes the monitoring and reporting of activity levels completed by the Action Agencies over the past four years under their current programmatic, updates the environmental baseline, and updates the Proposed Action to reflect current land management needs. Also updated are status of species and critical habitat listed under the ESA. Information contained in the 2002 BA that has remained static (i.e. references to geology, impacts to fish stocks at the turn of the 20^{th} century etc.) are incorporated by reference.

Table 1 displays species, Evolutionary Significant Unit (ESU) or Distinct Population Segment (DPS) category, ESA status, date of listing, and Federal Register reference for species covered in this document. The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), establishing Essential Fish Habitat (EFH) across Northwest Oregon is included and evaluates effects to coho and chinook EFH under MSA.

This Biological Assessment (BA) includes a number of individual actions which, when grouped together, represent programs that may occur at many individual sites across the landscape, on a routine basis or sporadically, and over multiple years (Table 2). This programmatic approach provides each Bureau of Land Management (BLM) and Forest Service (FS) administrative unit with a consistent methodology and appropriate criteria for implementing, documenting, evaluating and monitoring their land management activities. In addition, this approach facilitates ESA Section 7 and MSA consultation with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) and provides information in sufficient detail and quality to support the appropriate NMFS and USFWS analysis. Appendix A., Essential Fish Habitat, contains an assessment of EFH effects.

This BA evaluates and describes potential effects on bull trout (*Salvelinus confluentus*); Lower Columbia, Mid Columbia, and Upper Willamette steelhead (*Oncorhynchus mykiss*); Lower Columbia and Oregon Coast coho salmon (*Oncorhynchus kisutch*); Columbia River Chum Salmon (*Oncorhynchus keta)*, and Upper Willamette and Lower Columbia River chinook salmon (*Oncorhynchus tshawytscha*).

Table 1. Evolutionarily Significant Unit (ESU) or Distinct Population Segment (DPS), and Critical Habitat Addressed in this Biological Assessment

Species	ESU or DPS	ESA Status	Federal Register Notice and Date
Chinook Salmon	Upper Willamette River ESU*	Threatened	70 FR 37160 6/28/05
	Lower Columbia River ESU *	Threatened	70 FR 37160 6/28/05
Coho Salmon	Lower Columbia River ESU **	Threatened	70 FR 37160 6/28/05
	Oregon Coast ESU****	Threatened	73 FR 7816 2/11/2008
Steelhead	Lower Columbia River DPS*	Threatened	71 FR 834 1/5/06
	Middle Columbia River DPS*	Threatened	71 FR 834 1/5/06
	Upper Willamette River DPS*	Threatened	71 FR 834 1/5/06
Chum Salmon	Columbia River ESU*	Threatened	70 FR 37160 6/28/05
Bull Trout	Columbia River DPS***	Threatened	63 FR 31647 6/10/1998

*Critical Habitat for these species was designated on September 2, 2005 (70 FR 52629)
**Critical Habitat for this ESU has not been designated
***Critical Habitat has been designated for Bull Trout. The designation does not include Northwest Forest Plan lands
****Critical habitat was designed at listing on February 11, 2008 (73 FR 7816)

Table 2. Activity categories included in NW Oregon Programmatic BA.

Activities	Page
Road Maintenance and Storm Proofing	12
Repair of Storm-Damaged Roads	15
Recreation Site, Trail, and Administrative Structure Maintenance and Associated Public Use	16
Fisheries Program Surveys	18
Environmental Education Programs	19
Pump Chance/Helipond Maintenance and Use	19
Road Prism Salvage and Road-side Hazard Tree Removal	21
Miscellaneous Special Use Permits and Leases	22
Commercial Rafting Permits	22
Renewal of Existing Telephone Line and Power Line Special Use Permits	23
Special Forest Products	24

Compliance with other Management Plans

The assessment area of this BA includes those portions of the Eugene and Salem Districts of the BLM; Willamette, Mt. Hood and Siuslaw National Forests, and the Columbia River Gorge National Scenic Area of the FS, which are within ESU's or DPS' for the above-mentioned species (Table 1). All proposed programmatic activity categories comply with the Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (USDA and USDI 1994a); the Record of Decision (ROD) and Standards and Guidelines for Amendments to FS and BLM Planning Documents Within the Range of the Northern Spotted Owl (USDA and USDI 1994b), and respective BLM Resource Management Plans and the National Forest Land and Resource Management Plans.

This BA has been prepared in compliance with Section 7 of the ESA, as amended. Section 7 of the ESA assures that through consultation (or conferencing for proposed species or critical habitat) with the USFWS and NMFS, federal actions do not jeopardize the continued existence of any threatened, endangered, or proposed species, or result in the destruction or adverse modification of designated critical habitat.

Document Overview

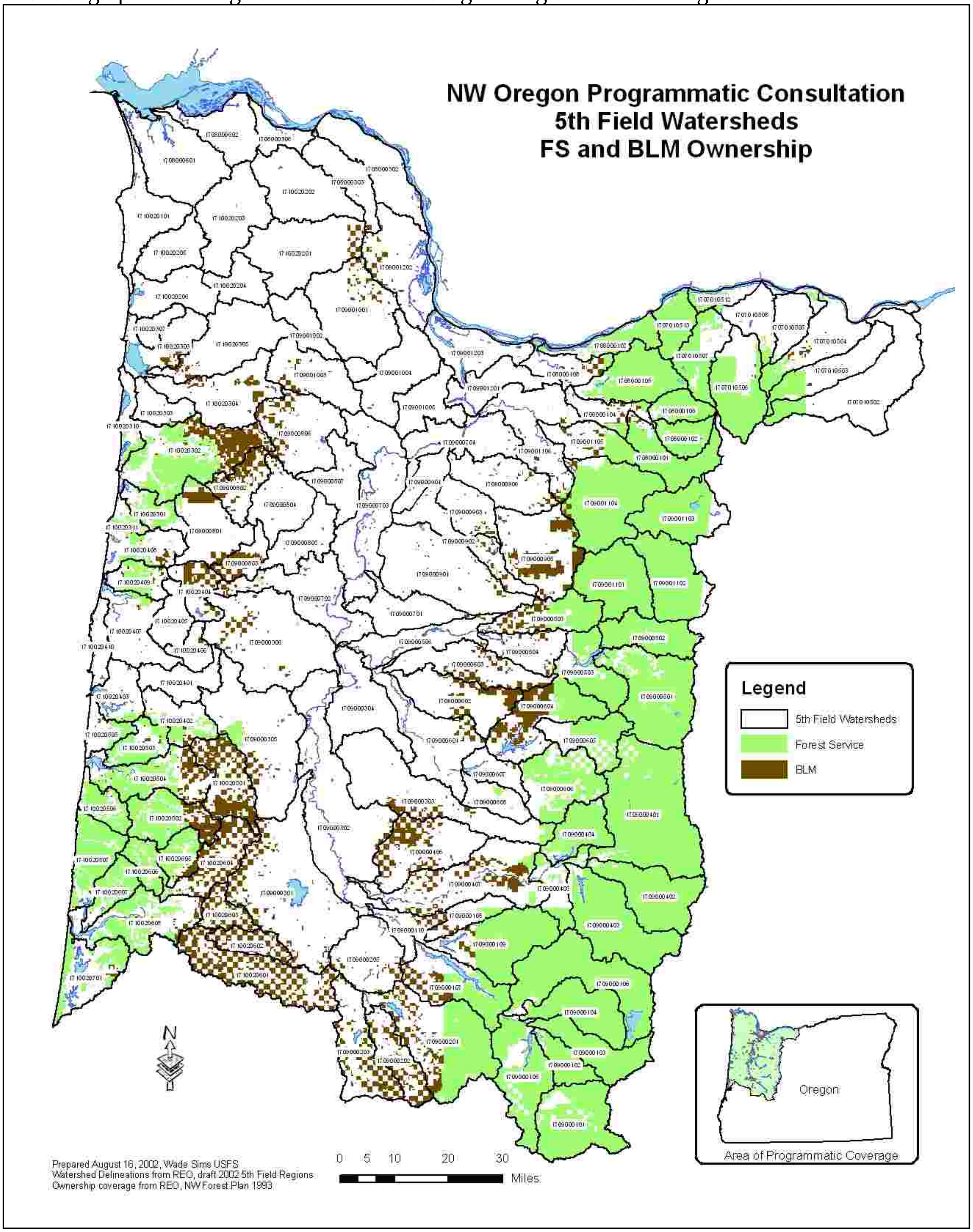
This BA begins with a description of the proposed action in Chapter II. The proposed action was updated by the Level 1 Team after review of current categories, activity reporting during 2003-2006, and projected activities for the next five years. Project design criteria, guidelines for project planning, and reporting requirements are also presented.

Levels of projected activities include projects that have federal funding and may occur on non-federal lands. Currently, this includes two types of projects, those commonly called Wyden Amendment projects (Forest Service Title III, Section 323, P.L. 105-277; Bureau of Land Management Title I, Section 123, P.L. 105-277) and those commonly called Payments to Counties projects (Secure Schools and Community Self-Determination Act (P.L. 106-393)). Payments to Counties projects are included since BLM and FS line officers approve the funding, authorization or implementation of projects on non-federal land. Project design criteria listed in Chapter 2, appropriate for a Payments to Counties project, should be incorporated into the grant agreement to the grant recipient.

Chapter III contains a description and status of affected species. There is a general discussion of life histories and habitat preferences of coho salmon, chinook salmon, chum salmon, steelhead and bull trout.

The action area and environmental baseline is described in Chapter IV. Environmental baseline information listing size, ownership and road and trail information for each fifth-field watershed is included. Watershed analysis reports were the basis for the environmental baseline. Each FS and BLM unit reviewed land management activities and natural environmental events, and updated their fifth-field baseline from the 2002 baseline as needed. A complete listing of watershed analyses within the Action Area is listed in Appendix B.

Figure 1. Geographic coverage of the Northwest Oregon Programmatic Biological Assessment



Effects are described in Chapter V using the matrix of pathways and indicators (NMFS 1996). Indicators can be affected positively or negatively during implementation of each activity category. For each activity category a summary of the typical range of effects are described. Effects were determined with the understanding that all Project Design Criteria would be implemented.

Chapters VI and VII summarize the ESA effects determination and describe ESA cumulative effects. Document chapters are followed by supporting documents found in appendices. For example, Appendix A discusses Essential Fish Habitat.

The Level 1 Team, in coordination with the Southwest Oregon Fisheries Level 1 Team, developed a notification process for projects with a potential to adversely affect ESA listed fish. NMFS and USFWS will be notified prior to project implementation. This change from previous documents will allow the regulatory agencies a period of time to review projects and offer additional site-specific information that may aid project planners.

This is the third in a series of consultation documents presented to USFWS and NMFS regarding these general categories of activities in Northwest Oregon. Overall, the design criteria in this document are similar to previous documents. Local FS or BLM fisheries biologists will continue to participate early in project design or planning or annual review of work to assure the appropriate level of consultation occurs and project design criteria are followed.

Project review could include determining “no effect” to a species or critical habitat documented in a project file; determining that a project falls within the typical range of effects as described in this BA resulting in pre-notification, implementation and reporting as described; or determining effects are greater than described in this BA and require a separate consultation.

Since this is an update of a current consultation (NMFS 2002/01254 and 2002/01880 and USFWS Log no. 1-7-03-F-20), this document incorporates by reference information in the existing BA and BO’s. Some reference information contained in the 2002 BA will not be repeated here, such as appendices describing Oregon Department of Fish and Wildlife’s in-water work window and Best Management Practices.

Glossary of Terms and Acronyms

BA Biological Assessment - a Section 7 consultation document typically prepared by the action agency, which analyzes the effects of proposed actions on ESA listed species.

BO Biological Opinion - a document which includes: (1) the opinion of the USFWS or the NMFS as to whether or not a Federal action is likely to jeopardize the continued existence of listed species, or result in the destruction or adverse modification of designated critical habitat; (2) a summary of the information on which the opinion is based; and (3) a detailed discussion of the effects of the action on listed species or designated critical habitat. [50 CFR §402.02, 50 CFR §402.14(h)]

BMP Best Management Practices - methods, measures, or practices selected by an agency to meet its nonpoint source control needs.

Environmental education field trips For purposes of this consultation, each time an environmental education field trip involving in-water activity or near stream activity is completed on a stream reach it will be counted as a separate field trip. For example, if there are five individual field trips to observe spawning salmon at the same site they would be reported as five visits.

Fish surveys For purposes of this consultation, each time a fisheries survey, such as a spawning survey, habitat survey, or snorkel survey, is completed on a stream reach it will be counted as a separate survey. For example, if a spawning survey is conducted five times on the same stream reach they would be reported as five surveys.

LAA Likely to Adversely Affect at least one individual of the listed fish species, either through direct or indirect effects, or through habitat alteration.

LWD Large Woody Debris - for purposes of this BA, LWD is as described in the Analytical Process (USDA et al. 2004); on the Oregon coast pieces that are >24" in diameter and >50' in length, elsewhere pieces that are >12" in diameter and >35' in length

NLAA Not Likely to Adversely Affect even one individual of an ESA-listed species, either directly, indirectly, or through habitat alteration.

ODFW Oregon Department of Fish and Wildlife

PDC Project Design Criteria – Conditions governing design and implementation conditions of a programmatic activity category.

Recreation site For purposes of this consultation a recreation site shall be described as follows:

Campground = 1 site
Day Use Area = 1 site
Managed dispersed camp sites, count each site as = 1 site

Riparian area For purposes of this consultation, the area along each side of a stream or body of water that directly influences fish habitat components (e.g., streambank vegetation, channel structure, and water quality). A default distance equal to one site potential tree height from the edge of a stream channel or water body will include these areas for most components (as described in FEMAT 1990) , although actual distance could be different depending on site conditions and the nature of the specific component.

Section 7 The section of the ESA outlining procedures for interagency cooperation to conserve federally listed species and designated critical habitats. Section 7(a) (1) requires Federal agencies to use their authorities to further the conservation of listed species. Section 7(a) (2) requires Federal agencies to consult with the USFWS or the NMFS to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Other paragraphs of this section establish the requirement to conduct conferences on proposed species; allow applicants to initiate early consultation; require the USFWS and the NMFS to prepare BOs and issue incidental take statements.

Section 7 consultation The various Section 7 processes, including both consultation and conference if proposed species are involved [50 CFR §402]

Standards and guidelines Written directions from a decision document (such as the 1994 ROD) that must be applied to federal public lands administered by the BLM and the FS.

Streamlined consultation agreement and procedures under which USFWS or NMFS, FS and BLM can conduct Section 7 consultation in the Pacific Northwest.

Chapter II – Proposed Action

A programmatic consultation, by definition, addresses an agency's multiple actions on a program, regional or other basis (USDI and USDC Consultation Handbook 1998). This consultation document presents activities that occur on a regular basis with known, predictable effects on lands managed by the Bureau of Land Management and Forest Service. The Northwest Oregon Programmatic BA covers a large geographic area. It is bordered on the south by the headwaters of the Willamette and Siuslaw rivers and Tahkenitch Creek; on the west by the Pacific Ocean, on the north by the Columbia River and on the east by the crest of the Cascades, slipping up the Columbia River to include the Hood River and Fifteenmile Creek watersheds in the Deschutes Basin. The analysis area is described in three general areas - the lower and mid-Columbia River, the Willamette River, and the north Oregon Coast which generally corresponds to the ESUs of fish addressed in this document.

In this chapter there is a description of the project category and a presentation of design criteria for that type of project. The proposed actions are programmatic, meaning that each category of actions may include a number of individual actions which, when grouped together, represent a program. For an activity to be covered by this programmatic the activity must follow the project design criteria (PDC) listed below.

A process to notify regulatory agencies of projects prior to their implementation is described. Finally, annual reporting and monitoring is presented.

Programmatic Activities and their Project Design Criteria

Activity category descriptions are provided to define the types of actions covered by this assessment. In some cases, the descriptions include exclusions, actions or situations not covered by the assessment. Actions or situations that have been excluded will require a separate consultation or conference prior to implementation if it is determined the action "may effect" a listed, proposed, or candidate species or critical habitat. PDC are described for each activity category. The PDCs are intended to minimize the potential adverse effects of actions and must be included in project design and implementation. For actions determined to be NLAA, the PDCs will help minimize impacts and, in some cases, are required to keep the action an NLAA.

Eleven categories of activities are described. The categories are based on monitoring activities from the 2002 Northwest Oregon Programmatic and projected needs of the land management agencies over the next five years. A summary of LAA activities completed 2002-2006 is found in Appendices D and F for anadromous species and Appendix E for bull trout. Review of completed activities helped frame the description of activities and design criteria for this document. The activity categories are listed in Table 3 and their potential effects (NLAA and/or LAA). The Projected Activity Tables (Appendices H, I and J) contain projections of how much activity will occur in each watershed each year. These projections are estimates based on activities completed in previous years. The actual amount and location of activities may vary based on budgets and need.

Projects will follow Oregon Department of Fish and Wildlife (ODFW) Guidelines for Timing of In-Water Work, where appropriate. If an action agency requests to Oregon Department of Fish and Wildlife to work outside the in-water work window, as a courtesy the action agency will also concurrently notify NMFS and/or USFWS.

Table 3. Activity categories included in NW Oregon Programmatic BA and their potential effects.

Activities	**Potential Effects**	
	LAA	**NLAA**
Road Maintenance and Storm Proofing	✓	✓
Repair of Storm-Damaged Roads	✓	✓
Recreation Site, Trail, and Administrative Structure Maintenance and Associated Public Use	✓	✓
Fisheries Program Surveys	✓	
Environmental Education Programs	✓	✓
Pump Chance/Helipond Maintenance and Use	✓	✓
Road Prism Salvage and Road-side Hazard Tree Removal	✓	✓
Miscellaneous Special Use Permits and Leases		✓
Commercial Rafting Permits	✓	
Renewal of Existing Telephone Line and Power Line Special Use Permits	✓	✓
Special Forest Products		✓

Actions will be implemented using the appropriate Best Management Practices, as identified by the action agency. Forest Service Best Management Practices are described in the publication: "Pacific Northwest Region General Water Quality Best Management Practices, 1988 (Forest Service R6 General Water Quality Best Management Practices)". Bureau of Land Management Best Management Practices are found in Appendix C of the current Resource Management Plans.

Category: Road Maintenance and Storm Proofing

Description: Road maintenance and storm proofing is used to maintain safety; control, reduce and/or prevent road erosion and sedimentation; and maintain or restore hydrologic function.

Road maintenance and storm proofing typically include use of heavy equipment for surface maintenance (grading, leveling), drainage maintenance, installation, replacement, or repair (ditch-lines, water dips, cross-drain culverts, and water bars), removal of fill to reduce potential sediment transport, vegetation management (brushing, limbing, seeding, mowing, and mulching), road cut and fill repair/stabilization, surface repair/replacement (paving, repaving, chip-sealing and rocking), small slide removal (i.e., routinely, quickly, and easily handled with typical maintenance equipment), snow-plowing, dust abatement (with water only), and maintenance and repair of structures (guardrails, signs, relief and stream crossing culverts, bridges).

This category includes the use of existing quarries for stockpiling waste material from road maintenance, slides, decommissioned roads, etc as well as aggregate for road surfacing.

See Road Prism Salvage and Road-side Hazard Tree Removal category for removal of trees from roadways. See Pump Chance/Helipond Maintenance and Use for water withdrawals for dust abatement.

Replacement of culverts on small streams (perennial and intermittent), which are not used by ESA-listed fish, can be covered with this consultation when the activity "may affect" ESA-listed fish or their habitat. These actions typically will occur on tributaries to streams with ESA-listed fish habitat where there may be downstream effects, typically sediment or turbidity.

Replacement or removal of stream crossing culverts and bridges on streams with ESA-listed fish are covered under the regional programmatic aquatic habitat restoration consultations from NMFS, "Endangered Species Act Section 7 Formal Programmatic Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Fish Habitat Restoration Activities in Oregon and Washington, CY2007-CY2012" (FS: P/NWR/2006/06530; BLM: P/NWR/2006/06532), and from USFWS, " Biological Opinion and Letter of Concurrence, USDA Forest Service, USDI Bureau of Land Management and the Coquille Indian Tribe for Programmatic Aquatic Habitat Restoration Activities in Oregon and Washington that Affect ESA-listed Fish, Wildlife, and Plant Species and Their Critical Habitats (TAILS #13420-2007-F-0055). These activities are not included in this consultation.

Project Design Criteria

1. Dispose of slide and waste material in stable, non-floodplain sites approved by a geotechnical engineer or other qualified personnel. Use stable sites beyond floodplain within riparian areas only if an interdisciplinary process has identified the area as stable and not susceptible to delivery to the adjacent stream. Provide erosion control to minimize sediment delivery to streams.

2. Minimize disturbance of existing vegetation in ditches and at stream crossings. Leave grass in the ditch when/where the ditch is properly functioning to minimize exposed soil and transport to fish bearing streams.

3. Minimize soil disturbance and displacement. Where sediment risks warrant, reduce off-site soil movement through use of filter materials (such as straw bales or silt fencing) if vegetated areas between the road and fish bearing streams are not present.

4. Implement "may affect" soil-disturbing maintenance activities during dry conditions to the greatest extent practicable, except where the potential for greater damage to water quality and fish habitat exists if the emergency road maintenance is not performed as soon as possible.

5. Refuel power equipment and perform allowed machinery maintenance and repair activities, using absorbent pads or chemical containment devices (for example, spill containment

tray with absorbent pad or a hole in the ground lined with plastic and absorbent pads) for immobile equipment, and prepare concrete at least 150 feet (or as far as possible from the water body where local site conditions do not allow a 150 foot setback from water bodies) to prevent direct delivery of contaminants into associated water bodies.

6. Where possible, take corrective actions to repair chronic problem areas such as sediment delivery or slope stability that have a potential to affect take of listed fish.

7. Where possible, ensure that all large wood is retained within, or as close to, the stream channel system during culvert cleaning activities. Large wood removed from the culvert inlet is typically placed below (downstream) of the culvert or in a nearby stream of floodplain area.

8. Road maintenance activities (e.g., grading, ditch cleaning, snow-plowing, etc.) would follow administrative unit Best Management Practices (see Appendix E. 2002 Northwest Oregon Programmatic Biological Assessment).

9. Lead-based paint removal or removal of structures containing lead paints is not covered.

10. Fresh concrete (cured less than 72 hours), concrete contaminated wastewater, welding slag and grindings, concrete saw cutting by-products, and sandblasting abrasives shall be contained and not come in contact with waterbodies or wetlands.

11. Limit riprap use to scour protection of existing bridge or culvert structures and the replacement of pre-existing rock riprap. Riprap use will be minimized to the greatest extent possible and designed in consultation with a fish biologist or hydrologist. Outside of these uses riprap is not authorized.

12. Streambank stabilization shall use bioengineered solutions (e.g., root wads, log toes, coir logs, woody and herbaceous plantings). A minimum amount of rock may be used for infrastructure (e.g., road) protection when no alternative (e.g., road realignment) exists, but bioengineered components shall be the preferred design feature when feasible.

13. Replacement or removal of small stream crossing culverts on streams with no ESA-listed fish shall meet the following criteria:

a. Design replacement stream crossing culverts to pass the 100-year peak flood.

b. Minimum culvert width will be equal to the bankfull channel width.

c. For fish-bearing streams, follow ODFW fish passage guidelines.

14. Follow ODFW Guidelines for Timing of In-Water Work, where relevant, except where the potential for greater damage to fish, water quality, and fish habitat exists. Exception for bull trout: Does not include roadwork conducted between Sept 1 and April 30 on road segments with a hydrologic connection and a potential to deliver sediment to bull trout spawning habitat.

15. Rock quarry use - If circumstances (e.g., emergency road repair) require such activities outside of the dry season, require all necessary BMPs and other mitigation measures to prevent sediment movement into streams, and, if appropriate, initiate emergency consultation. There are no active quarries within 300 feet of known bull trout spawning areas within the Action Area.

Category: Repair of Storm Damaged Roads

Description: This category includes routine projects to maintain safety, open access and prevent further damage to resources resulting from storm-related damage to roads. This category also includes immediate stabilization of storm-damaged roads to prevent or minimize adverse hydrologic effects or transmission of sediment into streams and other water bodies.

To be covered by this programmatic these activities must be considered as "emergency" actions, as determined by a line manager or their designated representative. Actions must be those where immediate stabilization actions are needed and when the work cannot be delayed until the appropriate ODFW in-water work window for that watershed. Examples of included actions would be the repair or replacement of a stream crossing culvert when immediate replacement will minimize adverse hydrologic and sediment effects, the replacement of road fill where continued exposure to high streamflows will result in continued erosion, the potential loss of the road and when roads must be opened for human safety.

Projects involve actions such as the removal of landslide material; removal of downed trees; reconstruction, repair or minor relocation of roads damaged by surface erosion; fill failure, culvert failure; and stabilization of slopes. Work is accomplished using heavy equipment.

When activities are conducted under this category, the action agency is to notify, by e-mail, NMFS and/or USFWS within 1 working day following discovery of site after the storm event (or soon as feasible in case of power outages etc). Activities should always have a long-term neutral or beneficial effect on sediment regime or channel extension.

This category is not applicable for deferred major storm damage repairs or extensive storm damage repairs. Deferred major storm damage repairs are those that are delayed to a future date due to funding or NEPA considerations, or when engineering design work is required, or imminent risk of damage to natural resources has been minimized. Extensive damage may require consultation under emergency consultation procedures.

Project Design Criteria

1. Dispose of slide and waste material in stable, non- floodplain sites approved by a geotechnical engineer or other qualified personnel. Use stable sites beyond floodplain within Riparian areas only if an interdisciplinary team has identified the area as stable and not susceptible to delivery to the adjacent stream. Provide the erosion control necessary to minimize the likelihood of sediment delivery to water bodies.

2. Minimize soil disturbance and displacement. Where sediment risks warrant, prevent off-site soil movement through use of filter materials (such as straw bales or silt fencing) if vegetative buffers are not available.

3. Develop and implement an approved spill containment plan that includes having spill containment kit on-site and identified containment kit locations.

4. Place vehicle staging, maintenance, refueling, and fuel storage areas a minimum of 150 feet horizontal distance from any stream, or as far as possible from a water body depending on site conditions. When immobile power equipment is refueled, use absorbent pads or other chemical containment devices (for example, spill containment tray with absorbent pad or a hole in the ground lined with plastic and absorbent pads) to contain spills.

Category: Recreation Site, Trail, and Administrative Structure and Maintenance and Associated Public Use

Description: This category includes providing access to and use of public recreational facilities (at campgrounds, picnic areas, trails, boat ramps, etc.), including safety and property damage reduction. For purposes of this consultation a recreation site shall be described as follows: Campground = 1 site (regardless of the number of individual sites within the campground); Day Use Area = 1 site; Managed Dispersed camp sites, count each site as 1 site

Program activities consist of hazard tree management (at developed and dispersed recreation facilities, along trails, at rights-of-way, and for adjacent non-Federal land), facility maintenance, repair, and upgrade; trail maintenance and off-highway vehicle trail maintenance, repair, and upgrade (including that of stream crossings; typically using hand tools, hand power tools, small motorized equipment), brushing, tread work, minor realignment, saw-out of downed trees within a trail, boulder placement which limit vehicular activity associated with dispersed camp sites, and the construction and maintenance of small bridges in recreation sites and on trails.

This category does not include new construction of recreational facilities (campgrounds, picnic areas, trails, boat ramps, etc.) and construction of administrative structures. These will require separate environmental analysis and consultation.

Project Design Criteria

1. Follow ODFW Guidelines for Timing of In-Water Work, where relevant, except where the potential for greater damage to fish, water quality, and fish habitat exists. Exception for bull trout: Does not include work conducted between Sept 1 and April 30 in areas with a hydrologic connection and a potential to deliver sediment to bull trout spawning habitat.

2. Minimize adverse effects of brushing (e.g., loss of shade, bank stability, etc.) when trails or facilities occur within riparian areas by leaving as much of an uncut buffer as possible (i.e., usually at least a 10 foot buffer along intermittent and ephemeral streams, and a 20 foot buffer along perennial streams).

3. Consider relocating mobile infrastructure away from potential hazard trees. Where relocation is not feasible, consider limbing or topping to alleviate the potential hazard. Where falling is deemed necessary, directionally fall trees toward stream channels and riparian areas and leave the tree on site where it is safe and feasible to do so. 50% canopy closure must be maintained.

4. Do not remove down wood from sites in this category, except to clear trails, within 1 site potential tree distance of a stream channel, unless fisheries personnel determine that large woody material objectives for stream and riparian areas in the proposed project area are met (as defined in the glossary). Take steps to prevent firewood gathering and theft of large wood within riparian areas.

5. For downed logs within trail tread located within 1 site potential tree of a stream channel, consider rerouting the trail or providing safe passage over the downed log to retain the maximum feasible length. Saw-out the section of log blocking the trail only as a last option.

6. Prevent and minimize erosion from trails by designing and maintaining proper drainage structures with adequate spacing of waterbars especially before stream crossings.

7. Dispose of small (<3 cubic meters) slide and slump materials in stable areas and away from stream channels.

8. Refuel power equipment at least 150-feet from water bodies to prevent direct delivery of contaminants into a water body, or as far as possible from the water body where local site conditions do not allow a 150 foot setback.

9. Bull trout exceptions: In known areas of bull trout spawning habitat:
   a. Distribute or post educational materials regarding bull trout requirements and habitat management, and
   b. Where practicable, close and rehabilitate roads and sites where use is degrading known bull trout spawning habitat.

10. Use of lumber, pilings, or other wood products that are treated or preserved with pesticidal compounds (including, but not limited to, alkaline copper quaternary, copper boron azole, copper naphthenate, creosote) may not be used below ordinary high water, or as part of an in-water or over-water structure, except as described below.

   a. On-site storage. Treated wood shipped to the project area must be stored out of contact with standing water and wet soil, and protected from precipitation.

   b. Visual inspection. Each load and piece of treated wood must be visually inspected and rejected for use in or above aquatic environments if visible residues, bleeding of preservative, preservative-saturated sawdust, contaminated soil, or other matter are present.

c. Pre-fabrication and field preservative treatment. Use prefabrication to the extent feasible to ensure that cutting, drilling, and field preservative treatment is minimized. When field fabrication is necessary, all cutting and drilling of treated wood, and field preservative treatment of wood exposed by cutting and drilling, will occur above ordinary high water to minimize discharge of sawdust, drill shavings, excess preservative other debris in riparian or aquatic habitats. Use tarps, plastic tubs or similar devices to contain the bulk of any fabrication debris, and wipe off any excess field preservative.

d. Abrasion prevention. All treated wood structures, including pilings, must have design features to avoid or minimize impacts and abrasion by livestock, pedestrians, vehicles, vessels, floats, *etc*., to prevent the deposition of treated wood debris and dust in riparian or aquatic habitats.

e. Waterproof coating. Treated wood may be used to construct a bridge, over-water structure or an in-water structure, provided that all surfaces exposed to leaching by precipitation, overtopping waves, or submersion are coated with a water-proof seal or barrier that will be maintained for the life of the project. Coatings and any paint-on field treatment must be carefully applied and contained to reduce contamination. Surfaces that are not exposed to precipitation or wave attack, such as parts of a timber bridge completely covered by the roadway wearing surface of the bridge deck, are exempt from this requirement.

f. Debris Removal. Projects that require removal of treated wood must use the following precautions.

    i. Ensure that, to the extent feasible, no treated wood debris falls into the water. If treated wood debris does fall into the water, remove it immediately.

    ii. After removal, place treated wood debris in an appropriate dry storage site until it can be removed from the project area. Do not leave treated wood construction debris in the water or stacked on the streambank at or below the ordinary high water.

    iii. Evaluate treated wood construction debris removed during a project, including treated wood pilings, to ensure proper disposal of debris.

<u>Category: Fisheries Program Surveys</u>

Description: This category includes direct affects to listed fish and or habitat by assessments and monitoring of aquatic and riparian habitat conditions. Program activities consist of: aquatic habitat inventories; spawning surveys; fish presence surveys, snorkeling surveys; water quality monitoring; and aquatic macroinvertebrate collecting.

For purposes of this consultation, each time a fisheries survey, such as a spawning survey, habitat survey, or snorkel survey, is completed on a stream reach it will be counted as a separate

survey. For example, if a spawning survey is conducted five times on the same stream reach they would be reported as five surveys.

Any activities that involve "direct" take of a species should be covered under Section 10 permits (i.e., hook and line, netting, trapping, seining, electrofishing, etc.). However, surveys oriented towards observing fish presence and occupancy (i.e., spawning surveys and snorkeling) involve take that is incidental to the purpose of the activity, hence, can be covered under Section 7.

Design Criteria

1. Minimize amount of disturbance to fish by training personnel in survey methods that prevent or minimize harassment of fish. Contract specifications should include these measures.

2. Do not walk on fish redds or gravels that are suitable for spawning.

3. Coordinate with other local agencies to prevent redundant surveys.

4. Use of electro shockers is not covered by this analysis. Such use is covered under ESA Section 10.

Category: Environmental Education Programs

Description: This category includes education programs for the public about aquatic and riparian resources/values and about fishery resources. Programs such as supervised school activities i.e., Salmon Watch, Forest Field Day and Cascade Streamwatch are included.

For purposes of this consultation, each time an environmental education field trip involving in-water activity is completed on a stream reach it will be counted as a separate field trip. For example, if there are five individual field trips to observe spawning salmon at the same site they would be reported as five visits.

Design Criteria

1. If environmental education programs are near spawning fish monitor students so any disturbance is minimized.

2. Use multiple stream sites for educational field trips to minimize effects on any given stream or riparian area.

Category: Pump Chance/Helipond Maintenance and Use

Description: This category includes maintenance and use of pump chances and heliponds to support road maintenance, fire suppression and dust abatement activities.

Heliponds are used during fire suppression. Ponds are typically located in upslope areas and fed by 1st or 2nd order streams and or springs. Pond outlets flow in the same 1st or 2nd order streams that flow into the pond. Trees around the pond may be cleared for aircraft safety concerns. Ponds may be dredged to improve water storage capacity. Installation of drain pipes, riprap and liners on ponds may also occur.

Access routes to pump chances are maintained by removing vegetation from trails to pumper trucks and/or helicopter access points, removing trees from helicopter loading sites and the installation of boulders (or similar) to increase pool depth. Withdrawals from streams and ponds may be used for many activities (e.g., fire control, dust abatement, compacting roads, etc.). Typically, water may not be withdrawn from any particular site every year.

Note: This category is for maintenance of pump chances and heliponds for future firefighting activities, and other land management activities such as dust abatement. Actual wildfire suppression-related activities are covered separately under National Fire Plan Consultation Procedures.

Project Design Criteria

1. Dispose of slide material in stable, non-floodplain sites approved by a geotechnical engineer or other qualified personnel. Use stable sites beyond floodplain within riparian area only if an interdisciplinary team has identified the area as stable and not susceptible to delivery of sediment to the adjacent stream. Provide erosion control at disposal sites to minimize sediment delivery to water bodies.

2. Use sediment control measures such as straw bales, filter cloth, or sediment fences when conditions warrant their use.

3. Minimize disturbance of existing riparian vegetation to the greatest extent practical; in particular, maintain shade, bank stability, and large woody material recruitment potential.

4. Maximize maintenance activities during late summer and early fall to avoid wet conditions.

5. Follow ODFW Instream Work Guidelines where relevant.

6. Do not pump from streams that do not have continuous surface flow.

7. When pumping water from streams with listed fish, ensure that withdrawals will not reduce flows by more than 10%. In other streams, ensure at least one-half the original streamflow volume remains below the pump site.

8. Refuel power equipment, or use absorbent pads or other chemical containment devices for immobile equipment, at least 150 feet (or as far as possible from the water body where local site conditions do not allow a 150 foot setback) from water bodies to prevent direct delivery of contaminants into associated water bodies.

9. Fisheries, hydrology or other qualified personnel shall work with engineering/fire personnel to review proposed activities to minimize potential effects to stream channel conditions and water quality.

10. Encourage decommissioning of unnecessary stream pump chances as well as switching toward the use of off-channel ponds.

11. As appropriate, water withdrawal equipment used in areas with fish present must have a fish screen installed, operated and maintained in accordance with NMFS' current fish screen criteria.

12. If the pond is within a riparian area adjacent to ESA/MSA listed fish streams, minimize disturbance of existing riparian vegetation to the greatest extent practical; in particular, maintain shade, bank stability, and large woody material recruitment potential.

13. Weirs (wood, rock or other material) built for the purpose of raising pump chance water levels in the channels of streams with ESA/MSA listed fish shall be removed at project completion.

Category: Road Prism Salvage and Road-side Hazard Tree Removal

Description: This category provides for the removal of downed trees within the road prism to provide access and removal of tree hazards. This includes a combination of cutting, moving, loading and hauling as conditions warrant. Downed trees maybe left on site, sold, or removed for other uses such as habitat restoration. Trees that are determined to be hazardous to road users must be felled for safety purposes, i.e., the tree or a portion of a tree that could fall into the road prism and cause injury or damage. Once felled, hazard trees are treated as downed trees in this category. The distance from roads where hazard trees may be felled is highly variable, but will typically be less than 200 feet.

Program activities consist of salvaging, removing and/or clearing of trees or portions of trees within the road prism (i.e., between top of cut to toe of fill). This includes a combination of cutting, moving, loading, and hauling as conditions warrant.

When in riparian areas, only those portions of trees within the road clearing limit can be removed. The road clearing limit is typically one to two meters outside of the road prism and is that area adjacent to the road prism from which standing vegetation has been removed. For roads outside of riparian areas, the entire tree is included in this consultation.

Project Design Criteria

1. Removal may occur within 150' of a fish bearing stream channel, when fisheries personnel determine that large woody material objectives for stream and riparian areas in the

proposed project area are met (as defined in the glossary). Leave downed logs on site where large woody material is deficit. 50% canopy closure must be maintained.

2. Where it is safe and feasible, downed trees or portions of downed trees within the road prism >8 inches (at largest end) that are not removed for salvage should be moved or placed off to the stream side of the road or used for instream restoration projects.

3. When in riparian areas, only those portions of trees within the road clearing limit can be removed. The road clearing limit is typically one to two meters outside of the road prism.

Category: Miscellaneous Special Use Permits and Leases

Description: This category allows miscellaneous designated activities authorized or permitted on Federal land. A recreation event is almost any kind of outdoor activity where participants exchange money or pay a fee for the opportunity to hold an event on federal lands. Examples of recreation event activities include: Nordic ski races; bike races; or private club outings, etc. A free permit is required for non-commercial group uses such as weddings, family gatherings or political rallies.

Program activities also include permits for (but not limited to): group recreation; outfitters and guides for non-aquatic activities (such as leading horseback rides); use of Federally owned structures; resort operation on Federal land; and summer home/recreational residence maintenance, including hazard tree removal, and administration; organizational camps; target ranges; fences; and weather stations. Special use permits are issued to members of the public.

Project Design Criteria

1. Prior to issuance of a special use permit (SUP), a fisheries biologist shall make a written evaluation of the proposed action and any interrelated and interdependent effects of the action. Consult individually if effects of action are reasonably likely to take listed fish species or adversely affect habitat in riparian areas.

2. New SUPs with new construction of large scale, ground disturbing activities such as new recreational residences, organizational camps, and/or resorts are not covered by this BA.

3. When hazard trees are removed, 50% canopy closure must be maintained.

Category: Commercial Rafting Permits

Description: Program activities include permits for outfitters and guides for surface water recreating (commercial river rafting), and other aquatic activities such as kayaking competitions on Federal land.

Special use permits are issued to members of the public to allow and track activities otherwise not permitted/monitored.

Project Design Criteria

1. Prior to issuance of a special use permit, a fisheries biologist shall make a written evaluation of the proposed action and any interrelated and interdependent effects of the action.

2. Special Use Permits for surface water recreating shall designate launch and take-out locations; avoid disturbance of adult fish; apply resource protection clauses that maintain habitat and minimize sedimentation and accidental capture/harm to bull trout; and where appropriate include educational materials describing bull trout identification and habitat requirements annually with issuance of special use permits.

3. When appropriate, permit holders will be required to provide restroom facilities (such as weekend events with a large numbers of visitors). Permit holders shall follow all health and sanitation laws.

4. In the Clackamas River basin no permits shall be issued between Labor Day and October 31 to protect spawning chinook salmon.

Category: Renewal of Existing Telephone Line and Power Line Special Use Permits

Description: This category includes vegetation, road, and pole maintenance associated with the renewal of existing telephone lines and non-Federal Energy Regulatory Commission-related powerline special use permits. Permitted road maintenance only applies to non-system spur roads needed to access lines.

Vegetative maintenance activities consist of brushing understory vegetation, tree limbing, chipping slash, and falling of hazard trees underneath or along telephone line and powerline corridors. Road maintenance consists of actions which are similar to those described under that programmatic category. Pole maintenance includes repair and replacement of damaged and downed poles and lines. Equipment (backhoes and trucks) are needed to carry, straighten and dig footings for poles. This activity does not include use of herbicides.

Project Design Criteria

1. Apply applicable PDCs from Road Maintenance programmatic category.

2. Fresh concrete (cured less than 72 hours), concrete contaminated wastewater, welding slag and grindings, concrete saw cutting by-products, and sandblasting abrasives shall be contained and not come in contact with waterbodies or wetlands.

3. Minimize brushing in riparian areas by leaving a minimum 25 foot buffer along streams

4. Directionally fell hazard trees toward streams and riparian areas where it is safe and feasible to do so.

5. Do not remove hazard or blowdown trees in riparian areas. If blowdown trees in riparian areas need to be cut, keep lengths as long as possible.

Category: Special Forest Products

Description: This category provides for the sale and collection of vegetative forest products.

Individual program actions consist of collecting mosses, mushrooms, greenery (e.g., boughs, leaves, fern fronds, vine maple, salal, huckleberry), ferns, cascara peelings, grasses, burls, cones, Christmas trees, transplants, scion wood, limbs, poles, posts, shake and shingle bolts and firewood. This category may include actions that occur within a riparian area, but which are not likely to result in ground disturbance or sediment delivery to a stream channel.

Project Design Criteria

1. Fisheries, hydrology or other qualified personnel should review collection areas proposed within riparian areas, and set boundaries or other limits as necessary to ensure that collection activities will not adversely affect riparian and aquatic habitat functions.

Implementation of the Programmatic Consultation

As actions are proposed, the responsible aquatic resources specialist (fisheries biologist or hydrologist) will analyze those actions to determine if they are consistent with one of the activity categories covered in this BA. This information will be documented in project files explaining how each action tiers to this BA.

- If the effects determination is the same as or less than the programmatic effects determination (e.g., programmatic effect determination is LAA and individual action is NLAA), no additional consultation is necessary.
- If the effects determination is LAA project notification is required.
- If the effects determination is greater than the programmatic effects determination (e.g., programmatic effects determination is NLAA and individual action is LAA), a separate consultation will be required.

Each action agency may also choose to initiate consultation if an individual action is of unusually large scale or is highly controversial, even if it would otherwise fit within one of the covered programmatic categories. Separate consultations will be required for all “may affect” actions which do not fit within programmatic categories. The aquatic specialist will insure that appropriate project design criteria will be incorporated into the implementation plan or contract.

If an action agency requests to Oregon Department of Fish and Wildlife to work outside the in-water work window, as a courtesy the action agency will also concurrently notify NMFS and/or USFWS.

Project Notification

1. Pre-notification on NLAA actions under this programmatic is not required.
2. Pre-notification on LAA actions that are anticipated to occur under the programmatic is required and will be conducted by the action agencies.
3. Because the programmatic activities have already proceeded through formal consultation, the FS or BLM shall not acquire additional approval from the regulatory agencies. However, the action agencies do recognize that regulatory agencies can offer additional site-specific information that may aid project planners.

Pre-Project Notification

The BLM and FS will provide the regulatory agencies with prior notification of all LAA actions that are anticipated to occur under this programmatic. Pre-notification will occur before an activity occurs and must occur at least once for each fiscal year. For example, pre-notification for all planned road maintenance activities can be submitted at one time for the entire year. At a minimum, all pre-notifications will be submitted by March 31. Pre-notification can be done either electronically or by hardcopy. See Appendix J for an example project notification form.

The following information will be provided per project or category:

- Location – 5th field HUC and name
- Timing – Project start and end dates
- Activity Category – All that apply from Table 3
- Project Description – a brief, concise description of the activity
- Extent – Number of miles, structures, visits, or permits
- Species Affected – Listed Fish, Critical Habitat, or EFH affected by the project.

<u>Example:</u>

- Location – Fall Creek (1709000109)
- Timing – 04/08 – 10/08
- Activity Category – Road Maintenance
- Project Description – Heavy equipment for surface maintenance (blading, ditch cleaning), vegetation management (brushing), and surface repair/replacement (placement of gravel aggregate)
- Extent – 10 road miles
- Species Affected – UWR spring chinook salmon, UWR spring chinook salmon critical habitat, and EFH

Because these are reasonably predictable actions, the following LAA categories are likely to be batched for a single submission each year:

- Road maintenance

- Recreation site maintenance
- Fish surveys
- Environmental Education
- Commercial rafting permits

Pre-notification will include the action agencies best estimate of the annual work anticipated for the fiscal year. All changes to the annual work will be reported with the year-end reporting. No pre-notification will be provided for LAA actions occurring where only EFH exists (no ESA species exist) if no habitat alterations are likely, i.e., fish surveys, environmental education and commercial rafting permits.

The following LAA activities do not occur at predictable intervals, or in a predictable location, and NMFS and/or USFWS will be e-mailed within the timeframes as described below:

- Storm Damage Repair – notify by e-mail within 1 working day following discovery of site after the storm event (or soon as feasible in case of power outages etc).
- Pump chance maintenance - notify by e-mail at least 2 weeks prior to start
- Telephone Right-of-Way - notify by e-mail at least 2 weeks prior to start
- Road prism salvage - notify by e-mail at least 2 weeks prior to start

Annual Reporting and Monitoring

Each year, the Level 1 Team must send a report to NMFS and USFWS. The Projected Activity Tables (Appendices H, I and J) contain projections of how much activity will occur in each watershed each year. These projections are estimates based on activities completed in previous years. The actual amount and location of activities may vary based on budgets and need.

Following the field season, the FS and BLM report the number of LAA projects in LAA activity categories, as shown on the Annual Reporting Form (Appendix C) for anadromous species and for bull trout. The report covers the fiscal year period (October 1 - September 30). The information is due by January 31 of the following year. The purpose of the reporting is to validate the extent and amount of incidental take. As needed, the Level 1 Team will meet after the annual reports are submitted to discuss each year's information.

Chapter III. Status of the Species

This section defines the biological requirements of each listed species affected by the proposed action, and the status of each designated critical habitat relative to those requirements. Listed species facing a high risk of extinction and critical habitats with degraded conservation value are more vulnerable to the aggregation of effects considered under the environmental baseline, the effects of the proposed action, and cumulative effects.

Status of the Anadromous Species. The NMFS reviews the condition of the listed species affected by the proposed action using criteria that describe a 'viable salmonid population' (VSP) (McElhany *et al*. 2000). Attributes associated with a viable salmonid population include abundance; productivity, spatial structure, and genetic diversity that maintain its capacity to adapt to various environmental conditions and allow it sustain itself in the natural environment. These attributes are influenced by survival, behavior, and experiences throughout the entire life cycle, characteristics that are influenced, in turn, by habitat and other environmental conditions.

***LCR Chinook salmon*.** The status of LCR Chinook salmon was initially reviewed by NMFS in 1998 (Myers *et al.* 1998) and updated in that same year (NMFS 1998a). In the 1998 update, the Biological Review Team (BRT) noted several concerns for this listed species. The 1998 BRT was concerned that there were very few naturally self-sustaining populations of native Chinook salmon remaining in the Lower Columbia River. A majority of the previous (1998) BRT concluded that LCR Chinook salmon were likely to become endangered in the foreseeable future. A minority did not feel that LCR Chinook salmon were not presently in danger of extinction, nor were they likely to become so in the foreseeable future.

New data acquired for the BRT (2003a) report includes spawner abundance estimates through 2001, new estimates of the fraction of hatchery spawners, and harvest estimates. In addition, estimates of historical abundance have been provided by the Washington Department of Fish and Wildlife (WDFW). Information on recent hatchery releases was also obtained. New analyses include the designation of relatively demographically-independent populations, recalculation of previous BRT metrics with additional years data, estimates of median annual growth rate under different assumptions about the reproductive success of hatchery fish, and estimates of current and historically available kilometers of stream.

A majority (71%) of the BRT votes for LCR Chinook salmon fell into the "likely to become endangered" category, with minorities falling into the "danger of extinction" and "not likely to become endangered" categories. Moderately high concerns for all VSP elements are indicated by estimates of moderate to moderately high risk for abundance and diversity. All of the risk factors identified in previous reviews were still considered important by the BRT. The Willamette/Lower Columbia River Technical Review Team has estimated that 8 to 10 historic populations have been extirpated, most of them spring-run populations, and the near loss of that important life history type remains in important BRT concern. Although some natural production currently occurs in 20 or so populations, only one exceeds 1,000 spawners. High hatchery production continues to pose genetic and ecological risks to natural populations and to mask their performance. Most LCR Chinook salmon populations have not seen as pronounced increases in recent years as occurred in many other geographic areas.

***LCR coho salmon*.** The status of LCR coho salmon was reviewed by NMFS in 1996 (NMFS 1996), 2001 (NMFS 2001), and 2003 (BRT 2003a). In the 2001 review, the BRT was very concerned that the vast majority (over 90%) of the historical populations of LCR coho salmon appear to be either extirpated or nearly so. The two populations with any significant production, the Sandy and Clackamas populations, were at appreciable risk because of low abundance, declining trends, and failure to respond after a dramatic reduction in harvest. The large number of hatchery coho salmon in the species was also considered an important risk factor. The majority of the 2001 BRT votes were for "at risk of extinction" with a substantial minority in the "likely to become endangered" category.

Relatively little new information was available for the 2003 review. A majority (68%) of the 2003 votes for LCR coho salmon fell into the "danger of extinction" category, with the remainder falling into the "likely to become endangered" category. As indicated by the risk matrix totals, the BRT had major concerns for this species in all VSP risk categories (risk estimates ranged from high risk for spatial structure/connectivity and growth rate/productivity to very high for diversity). The most serious overall concern was the scarcity of naturally-produced spawners, with attendant risks associated with small population, loss of diversity, and fragmentation and isolation of the remaining naturally-produced fish. In the only two populations with significant natural production (Sandy and Clackamas), short and long-term trends are negative, and productivity (as gauged by pre-harvest recruits) is down sharply from recent (1980s) levels. Originally part of a larger Lower Columbia River/Southwest Washington species, LCR coho salmon were identified as a separate species and listed as threatened on June 28, 2005.

***LCR steelhead*.** The status of LCR steelhead was initially reviewed by NMFS in 1996 (Busby *et al*. 1996), and the most recent review occurred in 1998 (NMFS 1998). In the 1998 review, the BRT noted several concerns for this species, including the low abundance relative to historical levels, the universal and often drastic declines observed since the mid-1980s, and the widespread occurrence of hatchery fish in naturally spawning steelhead populations. Analysis also suggested that introduced summer steelhead may negatively affect winter native winter steelhead in some populations. A majority of the 1998 BRT concluded that LCR steelhead were at risk of becoming endangered in the foreseeable future.

New data available for this update included recent spawner data, additional data on the fraction of hatchery-origin spawners, recent harvest rates, updated hatchery release information, and a compilation of data on resident steelhead. New analyses for this update include the designation of demographically-independent populations, recalculation of previous BRT metrics with additional years' data, estimates of median annual growth rate under different assumptions about the reproductive success of hatchery fish, and estimates of current and historically available kilometers of stream.

A large majority (over 79%) of the BRT votes for this species fell into the "likely to become endangered" category, with small minorities falling in the "danger of extinction" and "not likely to become endangered" categories. The BRT found moderate risks in all the VSP categories, with mean risk matrix scores ranging from moderately low for spatial structure to moderately

high for both abundance and growth rate/productivity. All of the major risk factors identified by previous BRTs still remain. Most populations are at relatively low abundance, and those with adequate data for modeling are estimated to have a relatively high extinction probability.

CR Chum salmon. The status of CR chum salmon was initially reviewed by the BRT in 1997 (Johnson *et al* 1997). NMFS provided an updated status report on CR chum in 1999 (NMFS 1999). As documented in the 1999 report, the BRT was concerned about the dramatic declines in abundance and contraction in distribution from historical levels. The BRT was also concerned about the low productivity of the extant populations, as evidenced by flat trend lines at low population sizes. A majority of the BRT concluded that the CR chum salmon ESU was likely to become endangered in the foreseeable future and a minority concluded that the ESU was currently in danger of extinction.

New data includes spawner abundance through 2000, with a preliminary estimate in 2002, new information on the hatchery program, and new genetic data describing the current relationship of spawning groups. New analyses include designation of relatively demographically independent populations, recalculation of previous BRT metrics with additional years data, estimates of median annual growth rate, and estimates of current and historically available kilometers of stream.

Updated information provided in the Good *et al.* (2005), the information contained in previous Lower Columbia River status reviews, and preliminary analyses by the Willamette/Lower Columbia Technical Review Team suggest that 14 of the 16 historical populations (88 percent) are extinct or nearly so. The two extant populations have been at low abundance for the last 50 years in the range where stochastic processes could lead to extinction. Encouragingly, there has been a substantial increase in the abundance of these two populations. In addition there are the new (or newly discovered) Washougal River mainstem spawning groups. However, it is not known if the increase will continue and the abundance is still substantially below the historical levels.

Nearly all of the likelihood votes for this ESU fell in the “likely to become endangered” (63 percent) or “danger of extinction” (34 percent) categories. The BRT had substantial concerns about every VSP element, as indicated risk estimates scores that ranged from moderately high for growth rate/productivity to high to very high for spatial structure. Most or all of the risk factors identified previously by the BRT remain important concerns. The Willamette/Lower Columbia Technical Review Team has estimated that close to 90 percent of the historical populations in the ESU are extinct or nearly so, resulting in loss of much diversity and connectivity between populations. The populations that remain are small, and overall abundance for the ESU is low. This ESU has showed low productivity for many decades, even though the remaining populations are at low abundance and density dependent compensation might be expected. The BRT was encouraged that unofficial reports for 2002 suggest a large increase in abundance in some (perhaps many) locations. Whether this large increase is due to any recent management actions or simply reflects unusually good conditions in the marine environment is not known at this time, but the result is encouraging, particularly if it were to be sustained for a number of years.

Limiting factors identified for Columbia River Chum Salmon include: (1) altered channel form and stability in tributaries, (2) excessive sediment in tributary spawning gravels, (3) altered stream flow in tributaries and mainstem Columbia, (4) loss of some tributary habitat types, and (5) harassment of spawners in tributary and Columbia mainstem (NMFS 2005b).

UWR Chinook salmon. The status of UWR Chinook salmon was initially reviewed by the BRT in 1998 (Myers *et al.* 1998) and updated in that same year (NMFS 1998). In the 1998 update, the BRT was concerned about the few remaining populations of UWR Chinook salmon, and the high proportion of hatchery fish in the remaining runs. The BRT noted with concern that the ODFW was able to identify only one remaining naturally reproducing population for this species: the spring-run Chinook salmon in the McKenzie River. The BRT was concerned that severe declines in short-term abundance had occurred, and that the McKenzie River population had declined precipitously, indicating that it may not be self-sustaining. The 1998 BRT also noted the potential for interactions between native spring-run and introduced fall-run Chinook salmon had increased relative to historical times due to fall-run Chinook salmon hatchery programs and the laddering of Willamette Falls. The BRT partially attributed the declines in UWR spring-run Chinook salmon to the extensive habitat blockages caused by dam construction. The BRT was encouraged by efforts to reduce harvest pressure on naturally-produced spring Chinook salmon in Upper Willamette River tributaries, and noted that the increased focus on selective marking of hatchery fish should help managers targeting specific populations of wild or hatchery Chinook salmon.

Another BRT document (BRT 2003a) covered data regarding: (1) Spawner abundance through 2002 in the Clackamas River, through 2001 in the McKenzie River, and through 2001 at Willamette Falls; (2) updated redd surveys in the basin; (3) new estimates of the fraction of hatchery-origin spawners in the McKenzie and North Santiam Rivers; (4) the first estimate of hatchery fraction in the Clackamas River (2002 data); and (5) information on recent hatchery releases. This update also included data on the designation of relatively demographically-independent populations, recalculation of previous BRT metrics in the McKenzie River with additional years of data, estimates of current and historically available kilometers of stream, and updates on current hatchery releases.

The updated information provided in the BRT (2003a) report, the information contained in previous UWR Chinook status reviews, and preliminary analysis by the Willamette/Lower Columbia technical recovery team indicate that most natural spring Chinook populations are likely extirpated or nearly so. The only population considered potentially self-sustaining is the McKenzie River population. However, abundance in this population has been relatively low (low thousands) with a substantial number of these fish being of hatchery-origin. The population increased substantially from 2000 to 2003, probably due to increased survival in the ocean. Future survival rates in the ocean are unpredictable, and the likelihood of long-term sustainability for this population has not been determined.

Although the number of adult spring-run Chinook salmon crossing Willamette Falls is in the same range (about 20,000 to 70,000 adults) it has been for the last 50 years, a large fraction of these are hatchery-produced. The score for spatial structure in BRT (2003a) reflects its concern that perhaps a third of the historical habitat used by this species is inaccessible (behind dams),

and that natural production is restricted to very few areas. Increases from 2000 to 2003 in natural production in the largest remaining population (the McKenzie River population) were considered encouraging by the BRT. With the relatively large incidence of hatchery fish, it is difficult to determine trends in natural production.

A majority (70%) of the BRT votes for this species fell into the "likely to become endangered" category, with minorities falling into the "danger of extinction" and "not likely to become endangered" categories. The BRT found moderately high risks in all VSP elements, with risk estimates ranging from moderate for growth rate/productivity to moderately high for spatial structure.

UWR steelhead. The status of UWR steelhead was reviewed in Busby *et al*. (1996) and updated in NMFS (1999). In the 1999 review, the BRT noted several concerns for this species, including the relatively low abundance and steep declines since 1988. The BRT was also concerned about the potential negative interaction between non-native summer steelhead and wild winter steelhead. The BRT considered the loss of access to historical spawning grounds because of dams to be a major risk factor. The 1999 BRT reached a unanimous decision that the UWR steelhead was at risk of becoming endangered in the foreseeable future.

New data considered in BRT (2003a) for UWR steelhead include redd counts and dam/weir counts through 2000, 2001, or 2002, and estimates of hatchery fraction and harvest rates through 2000. New analyses for this update include the designation of demographically-independent populations, and estimates of current and historically available kilometers of stream.

As part of its effort to develop viability criteria for UWR steelhead, the Willamette/Lower Columbia technical recovery team identified historically demographically-independent populations (Myers *et al*. 2002). Population boundaries are based on an application of VSP definition (McElhany *et al*. 2000). Myers *et al*. (2002) hypothesized that the species historically consisted of at least four populations: the Mollala, North Santiam, South Santiam and Calapooia, and possibly a fifth, the Coast Range. The historical existence of a population in the Coast Range is uncertain. The populations identified in Myers *et al*. (2002) are used as the units for the new analyses in BRT (2003a).

Based on the updated information provided in the BRT (2003a) report, the information contained in previous UWR steelhead species status reviews, and preliminary analyses by the Willamette/Lower Columbia technical recovery team, a single population that is self-sustaining could not be conclusively identified. All populations are relatively small, with the recent mean abundance of the entire species at less than 6,000. Over the period of the available time series, most of the populations are in decline. The recent elimination of the winter-run hatchery production will allow estimation of the natural productivity of the populations in the future, but the available time series are confounded by the presence of hatchery-origin spawners.

The majority (more than 76%) of the BRT votes for this species fell in the "likely to become endangered" category, with small minorities falling in the "danger of extinction" and "not likely to become endangered" categories. The BRT did not identify any extreme risks for this species but found moderate risks in all the VSP categories, ranging from moderately low for diversity to

moderate spatial structure and growth rate/productivity. On a positive note, after a decade in which overall abundance (Willamette Falls count) hovered around the lowest levels on record, adult returns for 2001 and 2002, were up significantly; on par with levels seen in the 1980s. Still, the total abundance is low, and while recent increases are encouraging, it is uncertain whether they can be sustained. The BRT considered it a positive sign that releases of the *early* winter-run hatchery population have been discontinued, but remained concerned that releases of non-native summer-run steelhead continue.

MCR steelhead. The MCR steelhead DPS includes all naturally-spawned populations of steelhead in streams within the Columbia River basin from above the Wind River in Washington, and the Hood River in Oregon (exclusive), upstream to, and including, the Yakima River in Washington, excluding steelhead from the Snake River basin.

The major tributaries occupied by this DPS are the Deschutes, John Day, Klickitat, Umatilla, Walla Walla, and Yakima River systems. The John Day River probably represents the largest naturally spawning native stock of steelhead in the region.

The Interior Columbia Basin Technical Recovery Team (ICTRT) (2003) identified 15 populations in four major population groups (MPGs) (Cascades Eastern Slopes Tributaries, John Day River, the Walla Walla and Umatilla Rivers, and the Yakima River) and one unaffiliated independent population (Rock Creek) in this DPS. There are two extinct populations in the Cascades Eastern Slope major population group: the White Salmon River and Deschutes River above Pelton Dam. Recent negotiations during the Federal Energy Regulatory Commission relicensing of Pelton Dam led to an agreement to restore anadromous fish passage to the Upper Deschutes River.

Seven hatchery steelhead programs are considered part of the MCR steelhead DPS. These programs propagate steelhead in three of 16 populations and improve kelt survival in one population. No artificial programs produce the winter-run life history in the Klickitat River and Fifteenmile Creek populations. All of the hatchery programs are designed to produce fish for harvest, although two are also implemented to augment the naturally spawning populations in the basins where the fish are released. The NMFS' assessment of the effects of artificial propagation on extinction risk concluded that these hatchery programs collectively do not substantially reduce the extinction risk of the DPS (NMFS 2004b). Artificial propagation increases total abundance, principally in the Umatilla and Deschutes Rivers. The kelt reconditioning efforts in the Yakima River do not augment natural abundance but do benefit the survival of the natural populations. The Touchet River Hatchery program has only recently been established, and its contribution to viability is uncertain. The hatchery programs affect a small proportion of the DPS. Collectively, artificial propagation programs provide a slight beneficial effect to abundance but have neutral or uncertain effects on productivity, spatial structure, and diversity.

The precise pre-1960 abundance of this DPS is unknown, but historic run estimates for the Yakima River imply that annual abundance may have exceeded 300,000 returning adults (Busby *et al.* 1996). MCR steelhead run estimates between 1982 and 2004 were calculated by subtracting adult counts for Lower Granite and Priest Rapids Dams from those at Bonneville Dam.

Steelhead remain well-distributed in the majority of subbasins occupied by this DPS. However, natural returns to the Yakima River, once a major historical production center for the DPS, continue to be less than 20% of the interim recovery abundance target for the subbasin (West Coast Salmon Biological Review Team (BRT) 2003b). The presence of substantial numbers of out-of-basin (and largely out-of-DPS) natural spawners in the Deschutes River also raised substantial concern within the BRT regarding the genetic integrity and productivity of the native Deschutes population.

The five-year average return (geometric mean) of natural MCR steelhead for 1997-2001 was up from previous years' basin estimates (BRT 2003b). However, the John Day is the only system at or above its interim abundance target, and all but two John Day steelhead populations have negative short-term growth rates. The Deschutes is close to its target, but there is significant concern about the affect on production in that drainage from fish from outside the DPS. The Touchet, Umatilla, and Yakima systems are all below their interim abundance targets.

Thus, despite recent increases in MCR steelhead returns, the BRT believes that the MCR steelhead remains at moderate risk for all four VSP parameters. Consequently the BRT has determined that the MCR steelhead remains likely to become endangered (BRT 2003b).

OC Coho Salmon. The Oregon Coast coho salmon ESU was assessed in two previous status reviews—one in 1995 (Weitkamp et al. 1995) and another in 1997 (NMFS 1997). In 1997, the BRT concluded that, assuming that 1997 conditions continued into the future (and that proposed harvest and hatchery reforms were not implemented), the Oregon Coast coho salmon ESU was not at significant short-term risk of extinction, but it was likely to become endangered in the foreseeable future. The BRT concluded that the ESU is likely to become endangered in the foreseeable future.

New information was available for the 2005 review (Good et al. 2005). The BRT received updated estimates of total natural spawner abundance for the return years 1990–2002 based on stratified random survey techniques, broken down by ODFW's monitoring areas (MAs), for 11 major river basins and for the coastal lakes system. Total recent average (3-year geometric mean) spawner abundance for this ESU is estimated at about 140,600, up from the 5-year geometric mean of 52,000 in the 1997 update and higher than the estimate at the time of the status review. In 2001, the ocean run size was estimated to be about 178,000; this corresponds to one-tenth of ocean run sizes estimated in the late 1800s and early 1900s, and only about one third of those in the 1950s. In 2002, the ocean run size increased to 304,500, fourth highest since 1970 and perhaps 25% of historical abundance. Present abundance is more evenly distributed within the ESU than it was in 1997.

The BRT found several positive features compared to the previous assessment in 1997. Adult spawners for the ESU in 2001 and 2002 exceeded the number observed for any year in the past several decades, and preharvest run size rivaled some of the high values seen in the 1970s. Some notable increases in spawners have occurred in many streams in the northern part of the ESU, which was the most depressed area at the time of the last status review evaluation. Hatchery

reforms have continued, and the fraction of natural spawners that are first-generation hatchery fish has been reduced in many areas, compared to highs in the early to mid-1990s.

On the other hand, the recent years of good returns were preceded by 3 years of low spawner escapements—the result of 3 consecutive years of recruitment failure, in which the natural spawners did not replace themselves, even in the absence of any directed harvest. These 3 years of recruitment failure, which immediately followed the last status review in 1997, are the only such instances that have been observed in the entire time series of data collected for Oregon Coast coho salmon. Whereas the recent increases in spawner escapement have resulted in long-term trends in spawners that are generally positive, the long-term trends in productivity in this ESU are still strongly negative.

The BRT votes reflected ongoing concerns for the long-term health of this ESU: a majority (56%) of the FEMAT votes were cast in the "likely to become endangered" category, with a substantial minority (44%) falling in the "not likely to become endangered" category. Although the BRT considered the significantly higher returns in recent years to be encouraging, most members felt that the factor responsible for the increases was more likely to be unusually favorable marine productivity conditions than improvement in freshwater productivity. The majority of BRT members felt that to have a high degree of confidence that the ESU is healthy, high spawner escapements should be maintained for a number of years, and the freshwater habitat should demonstrate the capability of supporting high juvenile production from years of high spawner abundance. As indicated in the risk matrix results, the BRT considered the decline in productivity to be the most serious concern for this ESU. With all directed harvest for these populations already eliminated, harvest management (i.e., reducing harvest rates) can no longer compensate for declining productivity. The BRT was concerned that if the long-term decline in productivity reflects deteriorating conditions in freshwater habitat, this ESU could face very serious risks of local extinctions during the next cycle of poor ocean conditions. With the cushion provided by strong returns in the last 2 to 3 years, the BRT had much less concern about short-term risks associated with abundance (mean score 1.9).

A minority of BRT members felt that the large number of spawners in the last few years demonstrate that this ESU is currently not at significant risk of extinction or likely to become endangered. Furthermore, these members felt that the recent years of high escapements, closely following years of recruitment failure, demonstrate that populations in this ESU have the resilience to bounce back from years of depressed runs.

The information included in the record of the January 2006 determination indicates that the OC coho ESU is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. New abundance and productivity data do not suggest the ESU's biological status has improved since the January 2006 determination. Efforts being made to protect the species, at present, do not provide sufficient certainty of implementation or effectiveness to mitigate the assessed level of extinction.

Status of Critical Habitat in the Lower Columbia and Willamette River Basins. Critical habitat has been designated in the Lower Columbia and Willamette River basins for Upper Willamette River spring Chinook salmon, Lower Columbia River Chinook salmon, Lower

Columbia River steelhead, Upper Willamette River steelhead, and Columbia River chum salmon. One species, Lower Columbia River coho salmon does not have designated critical habitat.

The Willamette River, once a highly braided river system, has been dramatically simplified through channelization, dredging, and other activities that have reduced rearing habitat by as much as 75 percent. In addition, the construction of 37 dams in the basin has blocked access to more than 435 miles of stream and river spawning habitat. The dams alter the temperature regime of the Willamette and its tributaries, affecting the timing and development of naturally spawned eggs and fry. Water quality is also affected by development and other economic activities. Agricultural and urban land uses on the valley floor and timber harvesting in the Cascade and Coast Ranges contribute to increased erosion and sediment load in Willamette River basin streams and rivers. Municipal and industrial pollution has been present in the Lower Willamette River since the 1920s. Gravel mining has considerable effects on substrate quantity and quality in the Upper Willamette River.

The mainstem Willamette River has been altered by historical channelization and large wood removal. Extensive agricultural and urban development reduced the riparian forest beginning in the 1870s (Sedell and Froggatt 1984). Sedell and Frogatt (1984) noted that agriculture and cutting of streamside trees were major agents of change for riparian vegetation, along with snagging of large wood in the channel. The reduced shoreline, fewer and smaller snags, and reduced riparian forest comprise large functional losses to the river, reducing structural features, organic inputs from litter fall, entrained allochthonous materials, and flood flow filtering capacity. Extensive changes began before the major dams were built, as the navigational and agricultural demands dominated the early use of the river. The once expansive forests of the Willamette River floodplain provided valuable nutrients and organic matter during flood pulses, food sources for macroinvertebrates, and slow-water refugia for fish during flood events, and LWD, which functions as a component of channel complexity. These forests also cooled river temperatures as the river flowed through its many channels. Similar changes have occurred along the major tributary streams to the Willamette River.

Several hydropower projects including the Bonneville Dam on the mainstem Columbia River adversely affect habitat along the Lower Columbia River. The series of dams along the Columbia River blocked an estimated 12 million cubic yards of debris and sediment that would otherwise naturally flow down the Columbia, replenishing the shorelines along the Washington and Oregon coasts.

Industrial harbor and port development have been significant along the mainstem Columbia River. One hundred miles of river channel within the mainstem Columbia River, its estuary, and Oregon's Willamette River have been dredged as a navigation channel by the Army Corps of Engineers since 1878.

In addition to the hydropower development in the Columbia River, complex freshwater and estuarine habitats needed to maintain diverse wild populations and life histories have been lost and fragmented, increasing the risk of extinction for salmon stocks in the Columbia River basin. Freshwater rearing sites and migration corridors for juvenile salmonids are PCEs of critical habitat. Not only have rearing habitats been removed or altered within the lower Columbia River,

but the connections among habitats needed to support tidal and seasonal movements of juvenile salmon have been severed. The most significant habitat changes in the Columbia River estuary have been the loss of tidal marsh and tidal swamp habitat that are critical to juvenile salmonids, particularly small or ocean-type salmonids (Johnson *et al.* 2003; Thomas 1983; USACOE 2001). The edges of marsh areas provide sheltered habitats for juvenile salmon where food in the form of amphipods or other small invertebrates which feed on marsh detritus is plentiful and larger predatory fish is avoided (Seaman 1977).

Altered channel morphology and stability, lost/degraded floodplain connectivity are significant limiting factors in the Willamette and Lower Columbia Rivers and their tributaries. Other major factors affecting critical habitat PCEs are loss of habitat diversity, excessive sediment, degraded water quality and increased stream temperatures. Reduced stream flows and fish passage blockages have reduced access to spawning and rearing areas (NMFS 2005b).

Status of Critical Habitat in the Middle Columbia River Basins.

There are 114 watersheds within the range of this ESU. Nine watersheds received a low rating, 24 received a medium rating, and 81 received a high rating of conservation value to the ESU (NMFS 2005). The lower Columbia River rearing/migration corridor downstream of the spawning range is considered to have a high conservation value and is the only habitat area designated in three of the high value watersheds identified.

Status of Critical Habitat in the Oregon Coast River Basins.

Critical habitat has been designated in the Oregon Coastal basins for Oregon Coast coho salmon. Habitat losses within the North Coast Province have been due to logging and agriculture (loss of LWD, sedimentation, loss of riparian habitat, temperature increases, habitat simplification), and urbanization (stream channelization, increased runoff, pollution, habitat simplification). Up to 96% of the original coastal temperate rainforest in Oregon has been logged and only 10-17% of old-growth forests in Douglas-fir regions of Oregon remain. Large, deep-pool habitats are a particular requirement of high quality stream habitat for coho salmon. FEMAT (1993) reported as much as an 80% reduction in the number of large, deep pools in streams on private lands in coastal Oregon. Overall, the frequency of large pools has decreased by almost two-thirds between the 1930s and 1992.

Coho salmon make extensive use of estuarine habitat on migration to the sea. Dahl (1990) reported that over 33% of wetlands in Oregon and Washington have been lost and that much of the remaining habitat is degraded.

Logging, agriculture, urbanization and grazing have led to large reductions in essential summer and winter rearing habitat for coho salmon (backwater pools, beaver ponds, side channel areas, deep lateral scour pools, dam pools, and stream margins where LWD and boulders form deep pockets of water. Loss of deep pool habitat make coho salmon vulnerable to high instream summer temperatures, winter flood events, lowered water quality, and predation by fish and birds due to lack of cover.

Columbia River Distinct Population Segment (DPS) of Bull Trout

The bull trout (*Salvelinus confluentus*) in the Columbia River basin, despite its relatively widespread distribution, has declined in both its overall range and numbers. Numerous extirpations of local subpopulations have been reported, with bull trout eliminated from areas ranging in size from relatively small tributaries of currently occupied, though fragmented habitat, to large river systems comprising a substantial portion of the species' previous range. Bull trout in the Columbia River DPS are currently limited to 141 isolated subpopulations, which indicate habitat fragmentation and geographic isolation. Many remaining bull trout occur as isolated subpopulations in headwater lakes or tributaries with migratory life histories lost or restricted. Remaining important strongholds tend to be found within large areas of contiguous habitats in the Snake River basin of central Idaho, upper Clark Fork and Flathead rivers in Montana, and the Blue Mountains in Washington and Oregon. The decline of the bull trout is due to habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, fisheries management practices and the introduction of non-native species. Most bull trout subpopulations are affected by one or more threats.

The Columbia River DPS was listed as threatened on June 10, 1998 (63 FR 31647). The Columbia River bull trout distribution within the Northwest Forest Plan area is contained only in portions of the lower and mid-Columbia basin. Current known bull trout distribution within the NWFP area includes portions of ten river basins in Oregon and Washington: the Willamette, Hood, and Deschutes River basins in Oregon; and the Lewis, Klickitat, White Salmon, Yakima, Wenatchee, Entiat, and Methow River basins in Washington. A total of 28 bull trout subpopulations occur within these basins in Oregon and Washington. The Columbia River DPS includes 22 separate recovery units, two of which are located within the area covered by this programmatic consultation, the Willamette River basin and Hood River basin.

Willamette River

Historically, bull trout are considered to have been distributed throughout the Willamette River in streams draining the west side of the Cascade Mountain Range. Presently, bull trout occur in the McKenzie River and the Middle Fork of the Willamette River where they were recently introduced. The construction of Dexter, Lookout Point and Hills Creek dams in the 1950's and 1960's and the chemical removal of "rough fish" (including bull trout) prior to the completion of Hills Creek dam significantly reduced bull trout populations. The last observed native bull trout was captured in 1990 above Hills Creek reservoir. Buchanan, et al. (1997) rated this population of bull trout as "probably extinct".

Starting in 1997, the Willamette National Forest and Oregon Department of Fish and Wildlife (ODFW) began a cooperative effort to reintroduce bull trout into the MFWR and its tributaries, above Hills Creek dam. Fry-stage bull trout were trapped in Anderson Creek, a tributary to the McKenzie River, and transported/released into tributaries to the MFWR in the upper watershed, approximately seven miles upstream from the Hills Creek Reservoir HUC5 watershed, and the Action Area. The number of bull trout released is shown in Table 4. It is likely that there are fewer than 2,000 individual fish in this population.

Evidence of successful bull trout spawning (redd observation or capture of female bull trout in a post-spawned condition) has been observed in 2005, 2006 and 2007. The recruitment rate of this natural production is still unknown.

Table 4. Number of Bull Trout Reintroduced to the Upper Middle Fork Willamette River.

Number of Fry-stage Bull Trout Transported and Released in the MFWR by Year										
2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997
233a	0	142	617	1,462	290	1,456	2,788	1,978	1,497	202

a = Fry were reared to 82-135mm length in a hatchery, and released as juvenile fish.

Extensive monitoring of the known bull trout population above Hills Creek dam suggests that adult and sub-adult bull trout are moving from their natal areas (transplant sites), and migrating downstream to the Hills Creek reservoir. These sub-adults and adult bull trout then migrate back to reaches of the MFWR near their natal areas to spawn, before returning to the reservoir.

The McKenzie River population consists of three isolated subpopulations: (1) McKenzie River (McKenzie River and tributaries from the mouth upstream to Trail Bridge Dam); (2) Trail Bridge (McKenzie River and tributaries above Trail Bridge Dam); and (3) South Fork McKenzie River (upstream of Cougar Reservoir in the South Fork McKenzie River). Mature bull trout in the entire McKenzie River system are suspected to number below 300 individuals, and only migratory fish are assumed to be present. Bull trout in the McKenzie River subpopulation spawn in two tributaries, Anderson and Olallie creeks, and use the mainstem McKenzie River seasonally from Trail Bridge Dam downstream to below Leaburg Dam. Redd counts within combined index areas on Anderson Creek ranged from 7 to 30 from 1989 through 1994, peaked at 85 in 1997, and have steadily declined to 47 in 2005 (USDA 2005).

Bull trout in the Trail Bridge subpopulation spawn in the McKenzie River above Trail Bridge Dam and in Sweetwater Creek. Between 0 and 15 redds have been observed in the McKenzie River. In 2000, 2 redds were detected in Sweetwater creek and have increased to 9 redds through 2005.

The South Fork McKenzie River subpopulation is isolated by Cougar Dam, which does not have volitional passage facilities. Spawning has been documented from a single tributary, the Roaring River. Redd counts in the Roaring River have ranged from 1 in 1993 to 35 in 2005 displaying an overall increasing trend. A more detailed discussion of bull trout status within the Willamette River basin can be found in Chapter 5 of the Draft Bull Trout Recovery Plan (USFWS 2002a).

<u>Hood River</u>

At the time of listing, there were two identified subpopulations of bull trout in the Hood River basin within the Middle Fork Hood River drainage: (1) Laurance Lake (upstream of Clear Branch Dam) and (2) Hood River (downstream of Clear Branch Dam and including tributaries). Historically, bull trout distribution included primarily the Hood River mainstem, Middle Fork and tributaries, and a short reach of the West Fork. Bull trout likely used the Columbia River for juvenile rearing and adult foraging (Buchanan *et al.* 1997). Punchbowl Falls is suspected to be a

natural barrier to fish migration in the West Fork of the Hood River during low flows; at the time of listing, only one bull trout had been captured at this location (Buchanan *et al.* 1997; Pribyl *et al.* 1996). Resident and migratory life history forms were identified above and below the Clear Branch Dam, and the total number of mature fish were believed to be below 300 individuals basin-wide (Buchanan *et al.* 1997).

Although upstream passage was provided by a trap at Clear Branch Dam, this subpopulation was considered isolated until information was available on trap effectiveness; the trap has subsequently been found to be ineffective. This subpopulation is at risk of stochastic extirpation due to its inability to be naturally reestablished, existence of a single spawning area, and low abundance.

Bull trout in the Middle Fork Hood River subpopulation (below the dam) are believed to spawn in Compass Creek and the Middle Fork Hood River. Nineteen fish with fork length greater than 200 millimeters (7.9 inches) were collected during surveys of Compass Creek in 1995 (Buchanan *et al.* 1997).

Information on bull trout distribution and abundance in the Hood River Basin is from a variety of sources, and includes a number of sampling methods. Trap information is available from the Powerdale Dam trap, a trap on the Punchbowl Falls fish ladder (which was discontinued following the 1964 flood), floating screw traps at several locations throughout the basin, and a trap at the base of Clear Branch Dam. Other information has come from individual observations, snorkel and electrofishing surveys.

Current bull trout distribution in the Hood River Recovery Unit occurs in five major areas within the basin: the Hood River, the East and West Fork of Hood River, the Middle Fork Hood River, and the Clear Branch of Hood River. Currently, bull trout are consistently found in only three of these areas, the Hood River, the Middle Fork Hood River, and the Clear Branch of Hood River. Bull trout distribution in the East and West Forks of Hood River are based on isolated, infrequent sightings.

Abundance studies conducted by ODFW in 2006 and 2007 estimated the local population (spawning adults) in Clear Branch above the dam to range between 46 (2006 estimate) to 93±5 (95% confidence interval) (ODFW 2007).

A more detailed discussion of bull trout life history within the Hood River basin can be found in Chapter 6 of the Draft Bull Trout Recovery Plan (USFWS 2002b).

<u>Clackamas and Santiam Rivers</u>

Currently, no bull trout are in the Clackamas or Santiam River basins, however historic populations were supported in both rivers. The last documented bull trout observations in these systems were in 1945 (North Santiam), 1953 (South Santiam), and 1960 (Clackamas) (Goetz 1989). A 1992 survey of the upper mainstem Clackamas River (river kilometer 79 to 85), the Collawash River (river kilometer 6.45 to 13), and the East Fork Collawash River (river kilometer 0 to 3.9) by U.S. Forest Service and Oregon Department of Fish and Wildlife personnel failed to

find bull trout (Eberl & Kamikawa 1992). Additional surveys in 1998 and 1999 failed to find bull trout in the upper mainstem Clackamas River (river kilometer 123.8 to 124.6) and tributaries (Cub, Berry, Farm, Dickey, Lemiti, and Squirrel Creeks), two tributaries of the Oak Grove Fork (Shellrock and Crater Creeks), and two tributaries (East Fork Collawash River and Elk Lake Creek) in the mainstem Collawash River (river kilometer 9.7 to 10.7)(Zimmerman 1999). Based on the size of bull trout recorded in creel records dating from the 1940's and 1960's and on the locations where the fish were caught, these populations probably had a fluvial life history. No estimates of historic abundance for the Clackamas and Santiam basins are available.

Status of Critical Habitat. The Service proposed to designate critical habitat for the bull trout on November 29, 2002 (67 FR 71235) and published a final critical habitat designation (70 FR 56212) September 26, 2005. There is no critical habitat designated for bull trout on Federal lands in NWFP areas.

There are populations of bull trout in the Hood River, Middle Fork Willamette and McKenzie River sub-basins. During the preparation of this document a computer based mapping exercise was completed in these sub-basins to assist in determining effects of activities on sensitive bull trout spawning areas. These maps are available at the Mt. Hood National Forest and the Willamette National Forest.

Chapter IV. Action Area and Environmental Baseline

This Biological Assessment covers those portions of northwest Oregon under the jurisdiction of the Salem and Eugene BLM Districts; the Mt. Hood, Siuslaw and Willamette National Forests; and the Columbia River Gorge National Scenic Area administrative units. This BA covers the above projects that occur within the range of species listed under the ESA of 1973, as amended, and current critical habitat as well as MSA essential fish habitat.

The Northwest Oregon Programmatic BA covers a large geographic area. It is bordered on the south by the headwaters of the Willamette and Siuslaw rivers and Tahkenitch Creek; on the west by the Pacific Ocean, on the north by the Columbia River and on the east by the crest of the Cascades, slipping up the Columbia River to include the Hood River and Fifteenmile Creek watersheds in the Deschutes Basin. The analysis area is described in three general areas - the lower and mid-Columbia River, the Willamette River, and the north Oregon Coast which generally corresponds to the ESUs of fish addressed in this document.

Contained within the geographic area, site-specific Action Areas are located in fish- and non-fish-bearing streams, riparian areas, and uplands that have a direct link to ESA- and MSA-listed fish and their habitats. The Action Area includes all areas to be affected directly or indirectly by the programmatic activities and not merely the immediate project area. Pre-implementation analysis of effects within the Action Area will determine take of listed specie(s) and overall take of the project.

Because this iteration of the programmatic BA is based on the 2002 effort, a brief summary of the 2001 analysis process follows. An assessment of individual and cumulative effects of each activity category was completed. Individual watersheds from the three major physiographic provinces (Western Cascades, Coast Range and Mid-Columbia) within Northwest Oregon, where activities occurred, were selected for further analysis. It was assumed that a 20 percent sample of watersheds in each physiographic province would likely represent the range of baselines and activities across each province. The 27 watersheds were selected between the 3 provinces using the following criteria: condition category (*properly functioning, at risk, and not properly functioning*) Matrix of Pathways and Indicators (NMFS 1996), the proportion of Federal lands in each watershed, relatively high amount of programmatic activities, and adequate baseline information. Of the 27 representative watersheds, 18 watersheds are located in the Willamette and Deschutes Provinces. Of the 27 watersheds selected, 2 are *properly functioning*, 12 are *functioning at risk*, and 11 are *not properly functioning*. For this iteration of the BA, the Level 1 team considers these 27 watersheds as still being representative of the remaining watersheds in the province that are not described because they represent a range of baseline conditions and have high levels of activity.

Watershed analyses are the basis for the environmental baseline. Watershed analyses are updated periodically with new and relevant information. A list of relevant watershed analysis documents is found in Appendix B. For this document, all watershed analyses are incorporated by reference.

Willamette River, Lower Columbia and Hood River Basins

The action area includes the majority of the HUC5 watersheds within the Willamette Valley, as well several HUC5 watersheds that drain into the Columbia River from the Oregon side both upstream and downstream from Portland, Oregon, within the Columbia River Gorge and the Hood River HUC4. These 63 HUC5 watersheds are identified in Table 5 below. This is a vast area that includes portions the east slopes of the Coast Range, the western slopes and the northern portion of the east slopes of the Cascade Range. The BLM lands are located at all elevations within the Coast Range and at the lower elevations of the Cascades and are typically intermingled with private industrial forestry lands. The Forest Service manages large blocks of contiguous lands in the mid and high elevations of the Cascades. Within the National Forests there are ten wilderness areas.

The majority of the action area watersheds are within the Willamette Valley. Major portions of the Willamette Valley have been converted to agricultural use (43% of the land area) and urban/rural areas (11%). In 1990, the population of the Willamette Valley was two million people, which represented 68% of Oregon's population (Baker et al. 2004). The Willamette River has been dramatically simplified through channelization, dredging, and other activities that have reduced rearing habitat by as much as 75 percent. In addition, the construction of 37 dams in the basin has blocked access to more than 435 miles of spawning habitat. The dams alter the temperature regime of the Willamette and its tributaries, affecting the timing and development of naturally spawned eggs and fry. Water quality is also affected by development and other economic activities. Agricultural and urban land uses on the valley floor and timber harvesting in the Cascade and Coast Ranges contribute to increased erosion and sediment load in Willamette River basin streams and rivers. Municipal and industrial pollution has been present in the Lower Willamette River since the 1920s. Gravel mining has considerable effects on substrate quantity and quality in the Upper Willamette River.

A series of tributary dams regulate stream flow. Releases from 13 tributary reservoirs are managed for water quality enhancement by maintaining a flow of 6,000 cfs in the Willamette River at Salem during summer months. Combined, the reservoirs control approximately 27 percent of the runoff from the watershed and provide approximately 1,600,000 acre-feet of flood control storage in the basin.

Major tributaries include the Calapooia, Clackamas, Coast Fork, Long Tom, Luckiamute, McKenzie, Marys, Middle Fork, Molalla, Santiam, Tualatin and Yamhill rivers. The tributaries have their headwaters along the eastern slopes of the Coast Range, the northern slopes of the Calapooya Mountains and the western slopes of the Cascade Range.

There are significant variations in streamflow regimes throughout the basin. Summertime flows in west-side streams originating in the Coast Range are extremely low. These streams include the Long Tom, Marys, Yamhill, and Tualatin rivers. East-side streams in low-lying watersheds such as the Calapooia, Pudding and Mohawk rivers and Mosby Creek have similar flow patterns. Other streams with higher elevation headwaters generally have more favorable flow conditions. These include the Santiam and McKenzie rivers. In addition, the federal flood control projects on

these streams are used to augment flows below the dams, including in the mainstem Willamette River.

Federal forest lands make up 76% of Hood River County (USDA-FS 1996b). The lower portions of the Hood River watershed have been extensively converted to agricultural uses, primarily fruit orchards. Dams and water withdrawals for irrigation block fish on the Middle Fork Hood River.

While there has been substantial habitat degradation across all land ownerships, including Federal lands, habitat in many headwater stream segments is generally in better condition than in the largely non-Federal lower portions of tributaries (Lee *et al*. 1997). Because Federal lands are generally forested and situated in upstream portions of watersheds, USFS and BLM lands now contain much of the highest quality salmon remaining in the Action Area.

In the lower Columbia River, the mainstem runs a varied course along the 146 miles from Bonneville Dam to the Pacific Ocean. The Willamette River and the Sandy River are the largest tributaries to the lower Columbia River on the Oregon side. Numerous minor tributaries drain small watersheds.

The river is relatively narrow at the Bonneville Dam—as little as 0.2 miles wide directly below the dam. It emerges from the steep-walled Columbia Gorge about 20 miles east of Portland. Below the cities of Washougal and Troutdale, the river valley widens to include a broad floodplain. The floodplain expands around the Columbia River's confluence with the Willamette River, where they form the sloughs and lakes of North Portland, Sauvie Island, and the Vancouver lowlands. These regions contain the metropolitan area's last major remnants of the swamp riparian system, which were nourished by annual flooding of the free-flowing rivers before dams were constructed.

Downstream from the town of St. Helens, the Columbia River cuts through the Coast Range, a passage marked by steep-shouldered bluffs and broad alluvial floodplains. The river channel, dotted with low islands of deposited sediments throughout its lower reaches, opens out as it approaches the Pacific Ocean.

The geology of the Columbia River Gorge National Scenic Area is dominated by basalt flows that occurred six to 17 million years ago. Today, these flows are exposed along the cliffs of the Columbia River Gorge. The present-day Columbia River Gorge began to form as the Cascade Range "uplifted." The river cut its present-day gorge through the Cascades.

North Oregon Coast

This assessment also includes the BLM and USFS lands within the North Coast Province. OC coho salmon is the only ESA-listed fish species within the North Coast Province. These streams and rivers also contain Essential Fish Habitat for coastal coho and chinook.

The north Oregon Coast is a long, narrow belt of moderately high mountains and coastal headlands. The north Oregon Coast portion extends from the Columbia River south to the

Umpqua River (exclusive) and east to the peak of the Coast Range. Elevation of the Coast Range is from sea level to about 4,000 feet. Extensive sands are present along much of the Oregon Coast. Most of the coastal streams are relatively small in size. Major river basins in the North Oregon Coast Province include the Nestucca River, Alsea River, and Siuslaw River. High rainfall causes rapid tree growth on highly erosive sandstone rock types. River and stream valleys are generally narrow with steep valley sidewalls. Little snowpack occurs in the watersheds and stream flows are comparatively low in the summer months when little rainfall occurs.

Environmental baseline conditions for the Willamette River, Lower Columbia and Hood River Basins

Table 5 provides a summary of the current habitat and watershed conditions at the HUC5 scales for 63 HUC5 watersheds within the action area, utilizing the definitions provided in NMFS (1996). Data collected from stream surveys, water quality monitoring, queries of the GIS database, and watershed analyses were utilized when available to provide the baseline conditions, but in many cases data were not available and best professional judgment was used. The baseline conditions were rated as Properly Functioning, Functioning At Risk (FAR), or Not Properly Functioning (NPF). The baseline was updated with the most current information and tools, thus the analysis may have some differences between the 2002 BA and this document. There is no doubt that changes in the baseline condition have changed in most watersheds, but those changes may not have been significant enough to warrant a change in ranking, (for example NPF to FAR). Only three HUC5 watersheds rated as properly functioning in all but 1 indicator: Middle Columbia/Grays Creek, Middle Columbia/Eagle Creek and the Columbia River Gorge Tributaries. The next best watersheds are Horse Creek, Breitenbush River and Oak Grove Fork Clackamas River. The watersheds in the poorest condition include Mohawk, Mosby Creek, Detroit Reservoir/Blowout Divide Creek, North Yamhill River, Quartzville and Middle Santiam River.

During the four years from 2003 to 2006, the BLM and Forest Service implemented activities covered under the 2002 programmatic consultation. These activities include not only the same categories of activities as this assessment, but also included many aquatic restoration related actions. Appendix D and Appendix E provide a summary of the programmatic actions, that were completed between 2003 and 2006 within the Willamette and Hood River basins, which were considered to be “may affect, likely to adversely affect” (LAA) ESA-listed anadromous salmonids and bull trout, respectively. These tables indicate that the majority of the LAA programmatic activities involved road maintenance, recreation and trail maintenance and fish/wildlife surveys (primarily spawning surveys).

Table 5. Environmental baseline summary for Willamette Province HUC5 watersheds in the action area. Key: 2 – Properly Functioning, 1 – Functioning At Risk, 0 – Not Properly Functioning, blank – Not enough data to rate baseline

					Indicator Baseline Condition																		
	HUC5 Code	HUC5 Watershed	Watershed Analysis #**	Approximate % Federal Ownership	Temperature	Sed. / Turbidity	Chemicals / Nutrients	Physical Barriers	Substrate/ Sediment	Large Woody Debris	Pool Quality	Pool Frequency	Off-Channel Habitat	Refugia	Width/Depth Ratios	Streambank Condition	Floodplain Conn.	Peak/Base Flows	Drainage Network	Road Density / Loc.	Riparian Reserves	Disturbance History	Disturbance Regime
Middle Columbia/Hood	1707010502	Fifteenmile Creek	3	9.4	1	0	1	2	2	2	1	0	2	1	1	0	1	1	1	0	1	1	1
	1707010503	Fivemile Creek	3	24.1	1	0	1	2	2	2	1	0	2	1	1	0	1	1	1	1	1	1	1
	1707010504	Middle Columbia / Mill Creek	21	12.4	1	0	1	1	2	1	1	0	1	1	1	1	1	1	1	1	1	1	1
	1707010506	East Fork Hood River	10	70.2	2	2	2	1	1	1	1	0	2	1	2	2	1	0	1	1	0	1	1
	1707010507	West Fork Hood River	16	67.3	1	2	2	1	1	1	1	1	1	1	2	1	1	1	1	0	1	1	1
	1707010508	Hood River	1	11.9	0	0	0	1	1	1	1	0	0	0	1	1	1	0	1	0	1	1	1
	1707010512	Middle Columbia / Grays Creek	19	14.3	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	1707010513	Middle Columbia/Eagle Creek	20	48.1	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Lower Columbia/Sandy	1708000101	Salmon River	6	93.2	1	1	1	2	2	1	1	0	0	1	1	2	1	1	1	1	1	1	1
	1708000102	Zigzag River	8	96.8	2	2	1	1	1	1	1	0	0	1	1	2	1	1	1	1	0	1	1
	1708000103	Upper Sandy River	15	89.9	1	2	1	2	2	1	1	1	1	0	1	1	1	1	1	1	1	0	0
	1708000104	Middle Sandy River	15	27.0	0	1	1	1	1	1	1	1	0	0	1	1	0	0	1	1	1	1	1
	1708000105	Bull Run River	17	87.8	2	2	2	0	1	1	1	1	1	1	1	2	1	2	2	1	2	1	1
	1708000107	Columbia Gorge Tributaries	19, 20	30.7	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	1708000108	Lower Sandy River	59	15.9	1	1	2	0	1	1	1	0	1	1	1	1	1	0	1	1	0	1	1

Table 5. Environmental baseline, Willamette Province (continued).

	HUC5 Code	HUC5 Watershed	Watershed Analysis #	Approximate % Federal Ownership	Indicator Baseline Condition: Temperature	Sed. / Turbidity	Chemicals / Nutrients	Physical Barriers	Substrate/ Sediment	Large Woody Debris	Pool Quality	Pool Frequency	Off-Channel Habitat	Refugia	Width/Depth Ratios	Streambank Condition	Floodplain Conn.	Peak/Base Flows	Drainage Network	Road Density / Loc.	Riparian Reserves	Disturbance History	Disturbance Regime
Middle Fork Willamette	1709000101	Upper Middle Fork Willamette River	27	89.8	1	0	2	1	0	0	0	0	1	1	1	1	1	0	0	0	0	1	1
	1709000102	Hills Creek	38	94.5	0	1	2	0	1	0	1	1	1	0	1	1	1	1	0	0	0	0	0
	1709000103	Salt Creek / Willamette River	42	98.6	1	1	2	1	1	0	0	0	0	1	2	2	1	1	0	0	0	0	0
	1709000104	Salmon Creek	31	97.6	1	1	1	1	1	0	0	0	0	1	1	2	1	1	0	0	0	0	0
	1709000105	Hills Creek Reservoir	38	80.5	0	0	2	0	1	0	0	0	1	1	1	1	1	1	0	0	1	1	1
	1709000106	North Fork Of Middle Fork Willamette	24, 26	93.5	1	1	2	1	1	1	1	1	2	1	1	2	2	1	1	1	1	1	1
	1709000107	Middle Fork Willamette / Lookout Point	75	57.1	0	1	1	1	1	0	1	0	1	0	1	1	0	0	0	0	0	0	0
	1709000108	Little Fall Creek	36, 73	22.9	0	0	2	1	1	0	1	1	1	1	1		1	2	0	0	1	0	0
	1709000109	Fall Creek	32, 37	80.1	0	0	2	0	0	0	0	0	1	1	0	0	1	1	0	0	0	1	1
	1709000110	Lower Middle Fork Willamette River	35, 40, 74	13.0	1	1	1	1	1	0	0	1	1	0	1	1	0	0	0	0	0	0	0
Coast FK	1709000202	Mosby Creek	71	27.5	0	1	1	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0
Mid Willamette	1709000303	Calapooia River	67	8.0	0	1	0	1	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0
	1709000306	Luckiamute River	52, 53	4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 5. Environmental baseline, Willamette Province (continued)

	HUC5 Code	HUC5 Watershed	Watershed Analysis #	Approximate % Federal Ownership	Indicator Baseline Condition																		
					Temperature	Sed. / Turbidity	Chemicals / Nutrients	Physical Barriers	Substrate/ Sediment	Large Woody Debris	Pool Quality	Pool Frequency	Off-Channel Habitat	Refugia	Width/Depth Ratios	Streambank Condition	Floodplain Conn.	Peak/Base Flows	Drainage Network	Road Density / Loc.	Riparian Reserves	Disturbance History	Disturbance Regime
McKenzie	1709000401	Upper McKenzie River	29	96.6	2	1	2	1	2	1	1	1	1	1	2	2	1	1	1	1	1	1	1
	1709000402	Horse Creek	39	98.3	2	2	2	2	2	1	2	2	2	2	2	2	2	2	1	1	1	2	2
	1709000403	South Fork McKenzie River	23	93.5	1	1	2	0	1	1	1	1	1	0	1	2	1	1	1	0	1	1	1
	1709000404	Blue River	34	88.9																			
	1709000405	McKenzie River/Quartz Creek	45	45.7	1	1	2	2	1	0	1	1	1	1	1	1	1	1	1	0	0	0	0
	1709000406	Mohawk River	68, 69	23.5	0	1	0	0	0	0	1	1	1	1	1	0	1	1	1	0	0	0	0
	1709000407	Lower McKenzie River	70, 76, 77	19.7	2	1	1	2	1	0	1	1	0	1	1	1	1	1	0	0	0	0	0
North Santiam	1709000501	Upper North Santiam River	25	91.1	1	1	2	0	2	0	0	0	0	0	1	1	0	2	1	1	0	2	2
	1709000502	Breitenbush River	30	98.0	2	2	2	0	2	1	2	2	0	1	1	2	0	2	1	1	2	2	2
	1709000503	Detroit Reservoir / Blow Out Divide Creek	22, 43	73.1	0	0	2	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
	1709000504	Middle North Santiam River	41, 65	11.9	1	1	1	0	2	0	1	0	2		1	1	1	1	1	1	0	1	1
	1709000505	Little North Santiam River	64	68.1	1	1	1	2	2	0	2	0	2		0	0		0	1	1	1	1	1

Table 5. Environmental baseline, Willamette Province (continued)

	HUC5 Code	HUC5 Watershed	Watershed Analysis #	Approximate % Federal Ownership	Indicator Baseline Condition																		
					Temperature	Sed. / Turbidity	Chemicals / Nutrients	Physical Barriers	Substrate/ Sediment	Large Woody Debris	Pool Quality	Pool Frequency	Off-Channel Habitat	Refugia	Width/Depth Ratios	Streambank Condition	Floodplain Conn.	Peak/Base Flows	Drainage Network	Road Density / Loc.	Riparian Reserves	Disturbance History	Disturbance Regime
South Santiam	1709000601	Hamilton Creek / South Santiam River	60	4.1	0	1	1	2		1						1		0	1	0	0	0	0
South Santiam	1709000602	Crabtree Creek	58	17.6	1	1	1	0	1	0	1	0	1		0	0		0	1	0	0	0	0
South Santiam	1709000603	Thomas Creek	66	14.4	1	1	1	2	1	0	2	2	2		0	0		0	1	0	0	0	0
South Santiam	1709000604	Quartzville Creek	63	60.1	0	0	2	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
South Santiam	1709000605	Middle Santiam River	33	64.3	0	0	2	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
South Santiam	1709000606	South Santiam River	28	66.8	2	1	2	0	1	1	0	0	2	2	1	1	0	1	0	0	0	0	0
South Santiam	1709000608	Wiley Creek		7.6	1	1	2	1	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0
Mid Will	1709000702	Rickreall Creek	52	3.5	0	0	2	0	1	1	2	2	1	1		2	0			0	1	0	0
Yamhill	1709000801	Upper South Yamhill River	52	18.9	1	1	0	0	0	0	1	1	0	1		0	0			0	0	0	0
Yamhill	1709000802	Willamina Creek	50, 51	33.4	0	1	0	0	0	0	1	1	0	1		0	0			0	0	0	0
Yamhill	1709000803	Mill Creek/South Yamhill River	52	36.4	0	0	0	2	2	1	0	1	0	0		1	0			0	0	0	0
Yamhill	1709000806	North Yamhill River	46	10.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0

Table 5. Environmental baseline, Willamette Province (continued)

	HUC5 Code	HUC5 Watershed	Watershed Analysis #	Approximate % Federal Ownership	Indicator Baseline Condition: Temperature	Sed. / Turbidity	Chemicals / Nutrients	Physical Barriers	Substrate/ Sediment	Large Woody Debris	Pool Quality	Pool Frequency	Off-Channel Habitat	Refugia	Width/Depth Ratios	Streambank Condition	Floodplain Conn.	Peak/Base Flows	Drainage Network	Road Density / Loc.	Riparian Reserves	Disturbance History	Disturbance Regime
Molalla/ Pudding	1709000902	Butte Creek / Pudding River	54, 62	5.4	1	0	1	2	1	0	1	0	0	0		0		1	1	0	0	1	1
	1709000905	Upper Molalla River	61	28.9	0	1	1	2	2	0	1	0	2		0	1	1	0	0	0	0	1	1
Tualatin	1709001001	Dairy Creek	48	4.5	0	0	0	0	1	0	1	1	1	1		0	1			0	0	0	0
	1709001003	Scoggins Creek	49	4.5	0	1	1	0	0	0	1	1	1	1		1	1			0	1	1	1
Clackamas	1709001101	Collawash River	4, 57	100.0	0	1	1	1	1	1	2	1	1	1	1	2	1	1	1	1	1	1	1
	1709001102	Upper Clackamas River	7	93.8	2	2	2	1	2	1	2	0	1	2	0	1	1	1	1	0	1	2	2
	1709001103	Oak Grove Fork Clackamas River	9	85.9	2	0	2	2	2	1	2	2	2	2	0	2	1	0	0	0	1	0	0
	1709001104	Middle Clackamas River	2, 13, 14, 18	93.7	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1
	1709001105	Eagle Creek	5	37.0	0	0	2	2	1	1	1	1	0	1	0	1	1	1	1	0	1	1	1
	1709001106	Lower Clackamas River	12, 56, 55	5.7	1	1	2	1	1	0	1	1	0	0	0	1	0	1	0	0	0	0	0
Low Col.	1709001202	Scappoose Creek	47	5.2	0	0	2	0	0	0	1	1	0	0	0	1	0	1	1	0	0	0	0

**Water analyses are listed in Appendix B.

Temperature

Thirteen of the 63 watersheds are rated as Properly Functioning for temperature, 21 are rated Functioning At Risk and 25 are Not Properly Functioning. Most of the properly functioning watersheds were found in the Middle Columbia/Hood, Clackamas, Sandy, and McKenzie River basins. Nine HUC5 watersheds that are not properly functioning have large flood control dams and eight HUC5 watersheds have low federal ownership and high agricultural use.

Suspended Sediment/Turbidity

Only 11 of the 63 watersheds are rated as Properly Functioning for suspended sediment and turbidity, 31 are rated Functioning At Risk and 18 are Not Properly Functioning. The West Fork Hood River, East Fork Hood River, Horse Creek, Breitenbush, Upper Clackamas River, Zigzag, Bull Run and Upper Sandy River, and Middle Columbia/Grays Creek, Middle Columbia/Eagle Creek and the Columbia River Gorge Tributaries watersheds were properly functioning. Past timber harvest and road building are the most likely contributing factors in watersheds that were functioning at risk.

Chemical Contamination and Nutrients

Thirty-one of the 63 watersheds are rated as Properly Functioning for chemical contamination and nutrients, 21 are rated Functioning At Risk and eleven are Not Properly Functioning. The eleven watersheds with problems tend to be low elevation watersheds with low federal ownership and high agricultural use. One exception to this is the Salmon Creek HUC5 in the Middle Fork Willamette River basin.

Physical Barriers

Fifteen of the 63 watersheds are rated as Properly Functioning for physical barriers, 23 are rated Functioning At Risk and 24 are Not Properly Functioning. Many of the watersheds rated as not properly functioning include large hydropower dams that do not have fish passage and are currently blocking passage of anadromous salmonids and bull trout. Hydropower dams are present in the Oak Grove Fork Clackamas watershed but they exist above the reaches that are accessible to anadromous salmonids. Culverts at many road crossings that are partial or full barriers to fish movements occur in most watersheds.

Substrate

Eighteen of the 63 watersheds are rated as Properly Functioning for substrate, 29 are rated Functioning At Risk and 14 are Not Properly Functioning. The six properly functioning watersheds are all found in headwater areas, whereas six of the not properly functioning watersheds are lower elevation watersheds with high amounts of agricultural use.

Large Woody Debris

Only five of the 63 watersheds are rated as Properly Functioning for large woody debris: Fifteenmile Creek, Fivemile Creek, Middle Columbia/Grays Creek, Middle Columbia/Eagle Creek and the Columbia River Gorge Tributaries. Nearly half, 32, of all the watersheds rated Not Properly Functioning. 24 are rated Functioning At Risk. The low ratings for large wood are a result of land management practices that have removed wood from the stream channels and removed trees from riparian areas for timber and agricultural practices.

Pool Quality

Eleven of the 63 watersheds are rated as Properly Functioning for pool quality, 33 are rated Functioning At Risk and 16 are Not Properly Functioning. The watersheds in the best conditions are found in the Middle Columbia/Hood, Lower Columbia/Sandy, McKenzie, and Clackamas basins.

Pool Frequency

Eight of the 63 watersheds are rated as Properly Functioning for pool frequency, 23 are rated Functioning At Risk and 31 are Not Properly Functioning. The watersheds with the overall best conditions for this indicator are found in the Middle Columbia/Hood, Lower Columbia/Sandy, McKenzie, and Clackamas basins. Watersheds in the South Santiam and Middle Fork Willamette basins ranked the poorest for this indicator.

Off-channel Habitat

Fourteen of the 63 watersheds are rated as Properly Functioning for off-channel habitat, 22 are rated Functioning At Risk and 25 are Not Properly Functioning. Many of the watersheds rated as not properly functioning are lower elevation watersheds where low gradient channels are common. Many stream channels in these watersheds have been channelized, rerouted, or have become entrenched and no longer provide the off-channel habitats that they did historically. The best watersheds are found in the Middle Columbia/Hood and McKenzie basins.

Refugia

Only seven of the 63 watersheds are rated as Properly Functioning for refugia, 29 are rated Functioning At Risk and 18 are Not Properly Functioning. Seven watersheds were not rated for this indicator. The best watersheds are Middle Columbia/Grays Creek, Middle Columbia/Eagle Creek and the Columbia River Gorge Tributaries, Horse Creek, South Santiam River, Upper Clackamas River and Oak Grove Fork Clackamas River. The South Santiam HUC 5 watershed was rated high for refugia because it provides important spawning and rearing habitat for Chinook salmon and steelhead in the South Santiam River basin.

Width/Depth Ratio in Scour Pools

Only eight of the 63 watersheds are rated as Properly Functioning for the width/depth ratio indicator, 32 are rated Functioning At Risk and 13 are Not Properly Functioning. Eleven watersheds were not rated for this indicator. The properly functioning watersheds were the West Fork Hood River, East Fork Hood River, Middle Columbia/Grays Creek, Middle Columbia/Eagle Creek, Columbia River Gorge Tributaries, Upper McKenzie, Sale Creek/Willamette River and Horse Creek watersheds.

Streambank Condition

Seventeen of the 63 watersheds are rated as Properly Functioning for streambank condition, 29 are rated Functioning At Risk and 15 are Not Properly Functioning. Basins with the most watersheds that are properly functioning include Middle Columbia/Hood, Lower Columbia/Sandy, Middle Fork Willamette, McKenzie and Clackamas.

Floodplain Connectivity

Only five of the 63 watersheds are rated as Properly Functioning for floodplain connectivity, 31 are rated Functioning At Risk and 21 are Not Properly Functioning. Watersheds that are properly functioning are the Middle Columbia/Grays Creek, Middle Columbia/Eagle Creek, Columbia River Gorge Tributaries, N.F.M.F. Willamette and Horse Creek.

Peak/Base Flows

Only eight of the 63 watersheds are rated as Properly Functioning for the peak/base flow indicator, 29 are rated Functioning At Risk and 17 are Not Properly Functioning. Watersheds that are properly functioning are the Middle Columbia/Grays Creek, Middle Columbia/Eagle Creek, Columbia River Gorge Tributaries, Bull Run, Upper North Santiam, Breitenbush River, Little Fall Creek, and Horse Creek.

Drainage Network

Only four of the 63 watersheds are rated as Properly Functioning for the drainage network indicator, 37 are rated Functioning At Risk and 16 are Not Properly Functioning. Watersheds that are properly functioning are the Middle Columbia/Grays Creek, Middle Columbia/Eagle Creek, Columbia River Gorge Tributaries and Bull Run.

Road Density and Location

Only three of the 63 watersheds are rated as Properly Functioning for the road density, 18 are rated Functioning At Risk and location indicator while 41 are Not Properly Functioning. The three properly functioning watersheds are all in the Columbia River Gorge: Middle Columbia/Grays Creek, Middle Columbia/Eagle Creek, and Columbia River Gorge Tributaries. Past timber harvest activities accounts for most the high density of roads.

Riparian Reserves

Only 5 of the 63 watersheds are rated as Properly Functioning for the Riparian Reserve indicator, 22 are rated Functioning At Risk and 34 are Not Properly Functioning. The low ratings are a result of land management practices that have harvested and removed trees from riparian areas for timber and agricultural practices.

Disturbance History

Only 7 of the 63 watersheds are rated as Properly Functioning for disturbance history, 25 are rated Functioning At Risk and 30 are Not Properly Functioning. Middle Columbia/Grays Creek, Middle Columbia/Eagle Creek, and Columbia River Gorge Tributaries, Horse Creek, Upper North Santiam, Breitenbush River, and Upper Clackamas River are rated as properly functioning.

Disturbance Regime

Only 7 of the 63 watersheds are rated as Properly Functioning for disturbance history, 25 are rated Functioning At Risk and 30 are Not Properly Functioning. Middle Columbia/Grays Creek, Middle Columbia/Eagle Creek, and Columbia River Gorge Tributaries, Horse Creek, Upper North Santiam, Breitenbush River, and Upper Clackamas River are rated as properly functioning.

Bull Trout: Population Size and Distribution

Bull trout have more specific habitat requirements than most other salmonids (Rieman & McIntyre 1993). Habitat components that influence the species' distribution and abundance include water temperature, cover, channel form and stability, valley form, spawning and rearing substrate, and availability of migratory corridors (Fraley & Shepard 1989; Goetz 1989; Hoelscher & Bjornn 1989; Howell & Buchanan. 1992; Pratt 1992; Rich 1996; Rieman & McIntyre 1993; Rieman & McIntyre 1995; Sedell & Everest 1991; Watson & Hillman 1997). Watson and Hillman (1997) concluded that watersheds must have specific physical characteristics to provide the habitat requirements necessary for bull trout to successfully spawn and rear, and that these specific characteristics are not necessarily present throughout all watersheds. Because bull trout exhibit a patchy distribution, even in pristine habitats (Rieman & McIntyre 1993), individuals of this species should not be expected to simultaneously occupy all available habitats (Rieman *et al.* 1997).

Increased habitat fragmentation reduces the amount of available habitat and increases isolation from other populations of the same species (Saunders *et al.* 1991). Burkey (1989) concluded that when species are isolated by fragmented habitats, low rates of population growth are typical in local populations and their probability of extinction is directly related to the degree of isolation and fragmentation. Without sufficient immigration, growth for local populations may be low and probability of extinction high (Burkey 1989, 1995).

Metapopulation concepts of conservation biology theory have been suggested relative to the distribution and characteristics of bull trout, although empirical evidence is relatively scant (Dunham & Rieman 1999; Rieman & Dunham 2000; Rieman & McIntyre 1993). A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meffe & Carroll 1994). For inland bull trout, metapopulation theory is likely most applicable at the watershed scale where habitat consists of discrete patches or collections of habitat capable of supporting local populations. Local populations are, for the most part, independent and represent discrete reproductive units. Long-term, low-rate dispersal patterns among component populations influences the persistence of at least some of the local populations (Rieman & Dunham 2000). Ideally, multiple local populations distributed throughout a watershed provide a mechanism for spreading risk because the simultaneous loss of all local populations is unlikely. However, habitat alteration in a variety of forms has fragmented habitats, eliminated migratory corridors, and in many cases isolated bull trout in the headwaters of tributaries (Dunham & Rieman 1999; Rieman & Dunham 2000; Rieman *et al.* 1997; Spruell *et al.* 1999). Accordingly, human-induced factors as well as natural factors affecting bull trout distribution have likely limited the expression of the metapopulation concept for bull trout to patches of habitat within the overall distribution of the species (Dunham & Rieman 1999). A detailed description of the current distribution and abundance of bull trout in the upper Willamette River core area and Hood River core area can be found in the USFWS' draft bull trout recovery plan chapters 5 and 6 (USFWS 2002a, b), which is incorporated here by reference.

Bull Trout: Growth and Survival

The size and age of bull trout at maturity depends upon the life-history strategy and habitat limitations. Resident fish tend to be smaller than migratory fish at maturity and produce fewer eggs (Fraley & Shepard 1989; Goetz 1989). Resident adults usually range from 150 to 300 millimeters (6 to 12 inches) total length (TL). Migratory adults however, having lived for several years in larger rivers or lakes and feeding on other fish, grow to a much larger size and commonly reach 600 millimeters (24 inches) TL or more (Goetz 1989; Pratt 1985). Size differs little between life-history forms during their first years of life in headwater streams, but diverges as migratory fish move into larger and more productive waters (Rieman & McIntyre 1993).

The age at migration for juveniles is variable. Ratliff (1992) reported that most juveniles reached a size to migrate downstream at age 2, with some at ages 1 and 3 years. Pratt (1992) had similar findings for age-at-migration of juvenile bull trout from tributaries of the Flathead River. The seasonal timing of juvenile downstream migration appears similarly variable. Bull trout normally reach sexual maturity in 4 to 7 years and may live longer than 12 years. The species is iteroparous (i.e., can spawn multiple times in their lifetime) and adults may spawn each year or in alternate years (Batt 1996). Repeat-spawning frequency and post-spawning mortality are not well documented (Fraley & Shepard 1989; Leathe & Graham 1982; Pratt 1992; Rieman & McIntyre 1996), but post-spawn survival rates are believed to be high.

Bull trout typically spawn from late August to November during periods of decreasing water temperatures (below 9 degrees Celsius/48 degrees Fahrenheit). Redds are often constructed in stream reaches fed by springs or near other sources of cold groundwater (Goetz 1989; Rieman &

McIntyre 1996). Depending on water temperature, egg incubation is normally 100 to 145 days (Pratt 1992), and after hatching, juveniles remain in the substrate. Time from egg deposition to emergence of fry may surpass 220 days. Fry normally emerge from early April through May, depending on water temperatures and increasing stream flows (Pratt 1992; Ratliff & Howell 1992).

Bull Trout: Life History Diversity and Isolation

The multiple life-history strategies found in bull trout populations represent important diversity (both spatial and genetic) that help protect populations from environmental stochasticity. Bull trout exhibit both resident and migratory (i.e., fluvial) life-history strategies, as do many other salmonids. Resident bull trout reside their entire life within the stream or tributary within which they spawn and rear. Migratory bull trout spawn in tributary streams where they rear for up to four years, after which they migrate to either a larger river, lake, reservoir, or coastal waters, where they continue to forage for several years until they make a return migration back to the smaller (usually the natal) tributary to spawn (Rieman & McIntyre 1993). Resident fish may range from 150 to 300 millimeters in length while migratory fish may exceed 600 millimeters (Rieman & McIntyre 1993).

Bull Trout: Persistence and Genetic Integrity

Genetic variation is the raw material that allows organisms to adapt evolutionarily to changing environments. Significant reductions and fragmentation of habitat and associated reductions in population sizes have the potential to rapidly change the genetic composition of populations due to both random genetic drift and altered selection regimes. The amount of genetic variation in a population is a balance between (a) losses due to random genetic drift and directed natural selection and (b) gains due to mutation and migration from other populations (Wright 1931). Loss of genetic variation can influence the dynamics and persistence of populations through three mechanisms: inbreeding depression, loss of phenotypic variation, and loss of evolutionary potential (Allendorf & Ryman 2002). The loss of genetic variation in a population is directly influenced by the effective population size (N_e) (Ryman et al. 1995).

N_e provides a standardized measure of the amount of genetic variation that is likely to be transmitted between generations within a population. Effective population size allows one to predict potential future losses of genetic variation within a population due to small population size and genetic drift. Individuals within populations with very small effective population sizes are also subject to inbreeding depression because most individuals within small populations share one or more immediate ancestors (parents, grandparents, etc.) after only a few generations and will be closely related.

The likelihood that a population will persist (or go extinct) over time depends on both its demographic size and genetic effective size. The ability of a population to persist is, in part, a function of stochastic events as well as demographic and genetic risks. The impacts to a population of stochastic events are difficult to predict. For demographic risks to be minimized, it has been shown that the variance in population abundance over a time period covering two or more generations needs to be less than the mean abundance during that period. In general,

however, unless population sizes are very small demographic risks can be difficult to quantify. Alternatively, various size thresholds have been identified that are associated with the genetic risk to populations.

A N_e of 50 or more is recommended to avoid the immediate effects of inbreeding and should be considered a minimum requirement for the short-term conservation of populations (Franklin 1980; Soulé 1987). Increased homozygosity of deleterious recessive alleles is thought to be the main mechanism by which inbreeding depression decreases the fitness of individuals within local populations (Allendorf & Ryman 2002). Deleterious recessive alleles are introduced into the genome via random mutations, and natural selection is slow to purge them because they are usually found in the heterozygous form where they are not detrimental. When populations become small, heterozygosity decreases at the rate of $1/(2\ N_e)$ per generation which in turn causes an increase in the frequency of homozygosity of the deleterious recessive alleles.

Effective population sizes of 500 to 5000 have been recommended for the retention of evolutionary potential (Franklin & Frankham 1998; Lynch & Lande 1998). Populations of this size are able to retain additive genetic variation for fitness related traits gained via mutation (Franklin 1980). Total adult abundance of bull trout is difficult to estimate because of a lack of information, including the following: (1) proportion of adult population spawning in a given year, (2) number of redds per female bull trout (ratio of 2 redds to 1 female bull trout), and (3) sex ratio (ratio during spawning of 1.3 males to 1 female up to 1 male to 2 females) (ODFW 2001). Using professional judgment and the monitoring data collected to date, local biologists estimate that the total adult bull trout population in the entire Willamette Recovery Unit (USFWS 2002a) is no more than 300 fish and no more than 300 in the Hood River Recovery Unit (USFWS 2002b). Some local populations within these recovery units are significantly lower.

Environmental baseline conditions for the North Coast Drainages

Table 6 provides a summary of the current habitat and watershed conditions at the HUC5 scale for 30 HUC5 watersheds within the North Coast Province.

These coastal watersheds generally are functioning at risk. The best watersheds are the Upper Siletz, Drift Creek (Alsea), Cummins/Tenmile/Mercer Lake, and Wildcat Creek. The watersheds in the poorest condition include Sand/Spring Creek/Neskowin, Lower Yaquina, Lower Siletz and Lower Alsea.

During the four years from 2003 to 2006, the BLM and Forest Service implemented activities covered under the 2002 programmatic consultation. These activities include not only the same categories of activities as this assessment, but also included many aquatic restoration related actions. Appendix F provides a summary of the programmatic actions that were completed between 2003 and 2006, within the coastal basins, which were considered to be “may affect, likely to adversely affect” (LAA) ESA-listed anadromous salmonids. These tables indicate that the majority of the LAA programmatic activities involved road maintenance, recreation and trail maintenance and fish/wildlife surveys (primarily spawning surveys).

Temperature

None of the 30 watersheds are rated as Properly Functioning for temperature, 10 are rated Functioning At Risk and 11 are Not Properly Functioning.

Suspended Sediment/Turbidity

Only 1 of the 30 watersheds is rated as Properly Functioning for suspended sediment and turbidity, 14 are rated Functioning At Risk and 7 are Not Properly Functioning. Seven watersheds were not rated. The Upper Alsea watershed was properly functioning. Past timber harvest and road building are the most likely contributing factors in watersheds that were functioning at risk.

Chemical Contamination and Nutrients

Six of the 30 watersheds are rated as Properly Functioning for chemical contamination and nutrients, 10 are rated Functioning At Risk and 7 are Not Properly Functioning. The six watersheds that are Properly Functioning are The Upper Nehalem, Upper Siletz, Wolf Creek, Wildcat Creek, Lake Creek, and Deadwood Creek. The watersheds with problems tend to be watersheds with low federal ownership and high agricultural use.

Physical Barriers

Only 2 of the 30 watersheds are rated as Properly Functioning for physical barriers, 3 are rated Functioning At Risk and 25 are Not Properly Functioning. Culverts at many road crossings that are partial or full barriers to fish movements occur in most watersheds.

Substrate

None of the 30 watersheds are rated as Properly Functioning for substrate, 15 are rated Functioning At Risk and 11 are Not Properly Functioning. The generally poor ratings for this indicator are a result of past and present timber management and agricultural use.

Large Woody Debris

Only one of the 30 watersheds are rated as Properly Functioning for large woody debris: Cummins/Tenmile/Mercer Lake. Nearly all, 28, of all the watersheds rated Not Properly Functioning and 1 is rated Functioning At Risk. The low ratings for large wood are a result of land management practices that have removed wood from the stream channels and removed trees from riparian areas for timber and agricultural practices.

Pool Quality

Four of the 30 watersheds are rated as Properly Functioning for pool quality, 16 are rated Functioning At Risk and 5 are Not Properly Functioning. The watersheds in the best conditions are found in the Nestucca and Alsea basins.

Table 6. Environmental baseline summary for Coastal HUC5 watersheds in the action area. Key: 2 – Properly Functioning, 1 – Functioning At Risk, 0 – Not Properly Functioning, blank – Not enough data to rate baseline

					Indicator Baseline Condition																		
	HUC5 Code	HUC5 Watershed	Watershed Analysis #**	Approximate % Federal Ownership	Temperature	Sed. / Turbidity	Chemicals / Nutrients	Physical Barriers	Substrate/ Sediment	Large Woody Debris	Pool Quality	Pool Frequency	Off-Channel Habitat	Refugia	Width/Depth Ratios	Streambank Condition	Floodplain Conn.	Peak/Base Flows	Drainage Network	Road Density / Loc.	Riparian Reserves	Disturbance History	Disturbance Regime
Nehalem	1710020201	Upper Nehalem	84	3	0	0	2	0	0	0	1	2	2	0	1		1	1			0	1	1
Wilson/Trask/Nestucca	1710020301	Little Nestucca	95	49	1			0	1	0	1	0	1	1							0	0	0
	1710020302	Nestucca	94	64	0	1	1	0	0	0	1	1	2	0	1		1	1			0	0	0
	1710020303	Tillamook		3	0	1	0	0	0	0	2	2	2	0	1		0	1			0	1	1
	1710020304	Trask	86	8	0	0	0	0	1	0	1	0	2	0	1		1	0			0	0	0
	1710020305	Wilson	87	3	0	1	0	0	0	0	1	2	2	0	2		2	2			0	1	1
	1710020306	Kilchis	85	7	0	1	0	0	1	0	1	2	2	0	1		1	1			1	0	0
	1710020310	Sand/Spring/Neskowin	99	36	1	1		0		0	0	0	1	0							0	0	0

Table 6. Environmental baseline summary for Coastal HUC5 watersheds (continued).

	HUC5 Code	HUC5 Watershed	Watershed Analysis #**	Approximate % Federal Ownership	Indicator Baseline Condition																		
					Temperature	Sed. / Turbidity	Chemicals / Nutrients	Physical Barriers	Substrate/ Sediment	Large Woody Debris	Pool Quality	Pool Frequency	Off-Channel Habitat	Refugia	Width/Depth Ratios	Streambank Condition	Floodplain Conn.	Peak/Base Flows	Drainage Network	Road Density / Loc.	Riparian Reserves	Disturbance History	Disturbance Regime
Siletz/Yaquina	1710020402	Big Elk	93	33	0	0	0	0	0	0	1	1	0	0	0		0	0			1	0	0
	1710020403	Lower Yaquina		7	1		0	0		0	0		0		0		0	0			0	0	0
	1710020404	Upper Siletz	79	28	0	1	2	2	1	0	0	1	1	2	1		2	1			0	0	0
	1710020407	Lower Siletz	92	21				0	1	0	0	0	1	0	0						0	0	0
	1710020408	Salmon/Siletz	88	25	1			0		0	0	1	1	1							0	0	0
	1710020410	Devil's Lake/Moolack	78, 92	5	1			0	1	1	1	0	1	1							0	0	0
Alsea	1710020501	Upper Alsea	81, 82	54	0	2		1	1	0	1	0	1	0	0		1	1			0	0	1
	1710020502	Five River Lobster	89	81	0		1	0	1	0	2	2		0	1		1	0			0	0	0
	1710020503	Drift Creek	91	67	0	1	1	0	1	0	1	1	1	1	1		1	1			1	0	0
	1710020504	Lower Alsea	83	55	0	0	1	0	0	0	1	1	1	0	0		0	0			0	0	0
	1710020505	Beaver Creek/Waldport	98	33	1	1	0	0	1	0	2	1	1	0	0		0	0			0	0	0
	1710020506	Yachats	90	73	1		1	0		0	1	1		0	1		1	0			0	0	0
	1710020507	Cummins/Tenmile/ Mercer Lake	97	78	1	1		0	1	2	1	1	1	1	1		1	1			1	0	1

Table 6. Environmental baseline summary for Coastal HUC5 watersheds (continued).

	HUC5 Code	HUC5 Watershed	Watershed Analysis #**	Approximate % Federal Ownership	Indicator Baseline Condition																		
					Temperature	Sed. / Turbidity	Chemicals / Nutrients	Physical Barriers	Substrate/ Sediment	Large Woody Debris	Pool Quality	Pool Frequency	Off-Channel Habitat	Refugia	Width/Depth Ratios	Streambank Condition	Floodplain Conn.	Peak/Base Flows	Drainage Network	Road Density / Loc.	Riparian Reserves	Disturbance History	Disturbance Regime
Siuslaw	1710020601	Upper Siuslaw	107	44	0	1	1	0	1	0		1	1	0	0	0	1	0	1	0	0	0	0
	1710020602	Wolf	105	44	1	1	2	2	1	0		1	1	0	1	1	1	0	0	0	0	1	0
	1710020603	Wildcat	106	40	1	0	2	1	1	0		1	1	0	0	1	1	0	1	0	0	0	1
	1710020604	Lake Creek	104	46	0	1	2	1	0	0		0	0	0	0	1	0	0	1	1	0	0	1
	1710020605	Deadwood	100	81	0	1	2	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	1
	1710020606	Indian Creek/lake Creek	100	82	0	0	1	0	0	0	1	0	1	0	1		0	0			0	0	0
	1710020607	NF Siuslaw	102	76	0	0	1	0	0	0	1	0	1	0	1		0	0			0	0	0
	1710020608	Lower Siuslaw	101	44	0	1	1	0	1	0		0	0	0	1	1	0	0	1	0	0	0	1
Siltcoos	1710020701	Woahik/Siltcoos		41	0	0	1	0	0	0	2	0	1	1	1		0	0			0	0	0

Pool Frequency

Five of the 30 watersheds are rated as Properly Functioning for pool frequency, 12 are rated Functioning At Risk and 12 are Not Properly Functioning. The watersheds with the overall best conditions for this indicator are found in the Nestucca basin. Watersheds in the Siuslaw basin were ranked the poorest for this indicator.

Off-channel Habitat

Six of the 30 watersheds are rated as Properly Functioning for off-channel habitat, 18 are rated Functioning At Risk and 4 are Not Properly Functioning. The best watersheds are found in the Nestucca basin. Watersheds in the Siletz/Yaquina and Alsea basins were generally rated as At Risk.

Refugia

Only one of the 30 watersheds are rated as Properly Functioning for refugia, 6 are rated Functioning At Risk and 22 are Not Properly Functioning. The Upper Siletz HUC 5 watershed was rated high for refugia because it provides important spawning and rearing habitat for summer steelhead in the Siletz River basin. The refugia habitat is found above Siletz Falls, which has a fish ladder. However, while chinook are allowed above the falls, coho salmon are not.

Width/Depth Ratio in Scour Pools

Only one of the 30 watersheds is rated as Properly Functioning for the width/depth ratio indicator while 15 are rated Functioning At Risk and 10 are Not Properly Functioning. Four watersheds were not rated for this indicator. The properly functioning watershed is the Wilson River.

Streambank Condition

None of the 30 watersheds are rated as Properly Functioning for streambank condition, 5 are rated Functioning At Risk and 1 is Not Properly Functioning. However, 24 watersheds were not rated for this indicator.

Floodplain Connectivity

Only two of the 30 watersheds are rated as Properly Functioning for floodplain connectivity, 12 are rated Functioning At Risk and 11 are Not Properly Functioning. Watersheds that are properly functioning are the Wilson and Upper Siletz. Five watersheds were not rated for this indicator.

Peak/Base Flows

Only one of the 30 watersheds are rated as Properly Functioning for the peak/base flow indicator, 8 are rated Functioning At Risk and 16 are Not Properly Functioning.

Drainage Network

None of the 30 watersheds are rated as Properly Functioning for the drainage network indicator, 4 are rated Functioning At Risk and 2 are Not Properly Functioning. However, 24 watersheds were not rated for this indicator.

Road Density and Location

None of the 30 watersheds are rated as Properly Functioning for the drainage network indicator, 4 are rated Functioning At Risk and 2 are Not Properly Functioning. However, 24 watersheds were not rated for this indicator.

Riparian Reserves

None of the 30 watersheds are rated as Properly Functioning for the Riparian Reserve indicator, 4 are rated Functioning At Risk and 26 are Not Properly Functioning. The low ratings are a result of land management practices that have harvested and removed trees from riparian areas for timber and agricultural practices.

Disturbance History

None of the 30 watersheds are rated as Properly Functioning for disturbance history and 4 are rated Functioning At Risk and 26 are Not Properly Functioning.

Disturbance Regime

None of the 30 watersheds are rated as Properly Functioning for disturbance history, 9 are rated Functioning At Risk and 21 are Not Properly Functioning.

Chapter V - Effects

Matrix Indicators that can be Affected Positively or Negatively by Activity Category (Table 7), is a summary of the typical range of effects that are likely to occur in each activity category. Effects were determined with the understanding that all Project Design Criteria would be implemented. Table 7 displays all potential effects by marking each indicator column with an "x" if a programmatic category may affect the indicator. If an indicator column is marked with an "**X**" the programmatic category effect is likely to be an adverse affect to fish and/or critical habitat.

Road Maintenance and Storm Proofing (LAA less than 150' from LFH; NLAA at distances greater than 150' from LFH)

Temperature – Road maintenance activities such as rocking, grading, ditch cleaning, cutbank slide removal, pavement patching, bridge and culvert maintenance and snowplowing will not affect stream temperature. Typically, most of the roads that are maintained are located away from streams and come into contact with streams only at stream crossings. Since this work will occur on existing roads, openings in the overstory canopy already exist as a result of the initial road construction. These road activities are more likely to affect stream temperatures if the road being worked on runs parallel to the stream channel. Maintenance will normally only remove trees or shrubs that occur within the existing road prism or are leaning over the road (i.e., leaning away from the stream). Removal of these trees will normally not affect shade over streams. Changes in shade over streams should be minor and **insignificant** and any new openings should be small and sporadic, allowing for only limited opportunity for increased solar radiation on the channel.

Roadside brushing is primarily done to improve sight distances along roads for safety purposes. Generally, brushing is limited to within a few feet of the road ditchline and outside shoulder. Brushing removes ground vegetation growing adjacent to the road and tree branches growing toward the road. Riparian vegetation can be disturbed when roads are brushed, but vegetation and limbs growing over or towards streams are typically not cut. This type of activity may have no or very localized effects on water temperature because of the small amount of vegetation being removed. For roads that closely parallel streams or riparian areas, the effects to water temperature will depend on how close to the stream the road treated is, how much vegetation is brushed at a given site, and how much vegetation is currently available to shade the stream at the site or subwatershed scales. Maintenance of roads that do not parallel streams is likely to have negligible effects on temperature as only vegetation at stream crossings is brushed.

Table 7. Matrix indicators that can be affected positively or negatively by activity category. Categories marked with a "bold, large" **X** have adverse effects.

Programmatic Category	Water Quality			Habitat Access	Habitat Elements						Channel Conditions			Flow/ Hydrology		Watershed Condition				Fish
Indicator →	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Road Maintenance and Storm Proofing	x	**X**	x	x	**X**	**X**	x	x				x		x	x		x			**X**
Repair of Storm Damaged Roads	x	**X**	x	x	**X**	x				x		x			x		x			**X**
Rec Site/Trail/ Admin Mainntenance/Use	**X**	**X**	**X**		**X**	**X**		x			x	**X**					x			**X**
Fisheries Program Surveys																				**X**
Environmental Education																	x			**X**
Pump Chance/ Helipond Maintenance	x	**X**	x	**X**	x	x		x				x		x			x			**X**
Road Prism Salvage/Hazard Treee Removal	x	x			x	**X**											x			
Miscellaneous Special Use Permits/Leases	x	x	x		x	x											x			
Commercial Rafting Permits		x	x									x								**X**
Renewal of Telephone/Powerline Special Use Permits	**X**	**X**	x		x	x	x	x				x					x			
Special Forest Products						x											x			

Key: 1=Temperature; 2=Sediment/Turbidity; 3=Chemical Contamination/Nutrients; 4=Physical Barriers; 5=Substrate/Sediment; 6=Large Woody Debris; 7=Large Pools; 8=Pool Frequency /Pool Quality; 9=Off-Channel Habitat; 10=Refugia; 11=Width/Depth Ratios; 12=Streambank Condition; 13=Floodplain Connectivity; 14=Changes in Peak/Base Flows; 15=Increase in Drainage Network; 16=Road Density and Location;17=Riparian Reserves; 18=Disturbance History; 19=Disturbance Regime; 20=Biological Effects to Fish

Removal or brushing of roadside vegetation along roads that are located greater than 150' lateral distance from a stream with ESA-listed fish will likely have no effect, or no more than negligible effects, on stream temperatures where listed fish occur.

Sediment/Turbidity/Substrate – Road maintenance activities are designed to prevent the deterioration of roads due to regular use and natural erosion. Road maintenance is necessary to keep roads in good condition, minimize erosion, and identify and correct problems promptly (Furniss et al. 1991). Road maintenance work may involve a wide range of activities, including grading, ditch cleaning, slide removal and spot rocking of existing roads that may result in additional sediment input to streams.

Maintaining well vegetated ditches on forest roads has been shown to be an effective means to minimize sediment production (Luce and Black 1999, Bilby et al. 1989). However, ditches require periodic maintenance and may need to be cleaned if they become filled with sediment from the road surface or cut slopes. Luce and Black (2001) found that ditch cleaning increased sediment yield more than road use because cleaning the ditches broke up the armor layers of the ditch. When ditch cleaning is necessary, sediment removed from ditches that are hydrologically connected to streams should be stored in stable areas where it cannot be transported to streams (Reid and Dunne 1984).

Surfacing roads with rock aggregate or pavement can significantly reduce the amount of erosion from the road surface (Burroughs and King 1989). The type of rock used for surfacing can also influence sediment production. Hard, durable rock is more resistant to breakdown while softer rock is more easily crushed into particles small enough to be washed from the road surface (Bilby et al. 1989).

The PDCs were designed to minimize the amount of sediment generated by the maintenance of existing roads. Most road sediment will be trapped and stored in the ditches or on the forest floor below cross drains. The amount of sediment generated from these activities that may reach stream channels will depend, in part, on how extensive the work is, the maintenance level, timing of the maintenance, road location, ditchline extension, and the degree of hydrologic connection of the road segment. Road work completed during the wet season may increase erosion when loose fine sediments are exposed to high levels of precipitation and resultant runoff from the road surface and ditches and the associated cut and fill slopes. Vegetated buffer areas ranging in width from 40 to100 feet were successful in keeping sediment out of streams (Corbett and Lynch 1985, Erman et al. 1977, Gomi et al. 2005Lynch et al. 1985, Moring 1982, and Newbold et al. 1980). Broderson (1973, cited in Castelle et al 1992) found that 50 foot buffers were sufficient for controlling most sedimentation on less than 50% slopes, while steeper slopes required wider buffers. A maximum buffer width of 200 feet was found to be effective even on extremely steep slopes. Sediment from roads located greater than 150 ft. from LFH streams will likely be captured and entrapped within the buffer.

Sediment from ditchlines or from the road surface at stream crossings may have a hydrologic connection to streams containing ESA-listed fish. Much of the sediment that will reach small tributary streams should be stored at least temporally before it is able to reach streams occupied by listed fish. A study conducted by Duncan, et al, (1987), discusses the sediment retention in headwater streams. These experiments demonstrate the effectiveness of small headwater streams

at retaining, at least temporarily, the coarser-size sediments (>0.063 mm) washed from roads. By acting as storage areas, small tributary streams reduce the immediate input of sediment of this size to larger streams during storms of moderate intensity. This research suggests that the small tributaries leading to areas potentially occupied by listed fish and having potential to introduce sediment will likely be able to retain some amount of sediment from road run-off due to maintenance if the streams downhill contain woody debris and vegetation.

Road maintenance is not likely to measurably affect substrate composition. The amount of sediment that enters a stream is likely to be small, infrequent, and of short duration. Short- term effects such as localized increases in fine sediment in gravels or along channel margins may be seen. However, substrate quality would not decrease over time. If projects are successfully implemented, substrate quality should actually improve because chronic sediment sources would be corrected.

Road storm-proofing is done to reduce sediment and erosion from roads and reduce maintenance. Waterbars and drain dips are a common technique used. Properly located waterbars will displace water from the road surface onto stable side-slopes where it can infiltrate into the ground. Removing the water from the road's surface prevents water from accumulating and running down sloped roads causing ruts to form. Upgrading cross-drain culverts to larger capacity reduces the potential for the culverts to fail from either plugging or having inadequate capacity to carry stormflow in ditches. Adding additional cross-drain culverts shortens ditch lengths reducing the volume of flow that must be displaced at each culvert and reducing flow velocity, which in turn reduces the erosiveness of the ditchflow. Stormproofing activities disturb the road surface and may result in short-term sediment displacement, but in the long-term sediment from the road should be reduced.

Replacement of culverts on small streams will have local sediment and turbidity effects. The sediment plume from these actions will likely be limited to the immediate vicinity and should dissipate within a few hours. Depending on how close the project site is to a stream with listed fish habitat, the listed fish habitat may be affected. It is anticipated that all project related sediment will be flushed out during the first fall/winter/spring high flows after project completion. Therefore, long-term impacts to turbidity and spawning gravels are not expected.

Rock quarry activities can generate sediment when pits are used for stockpiling waste material. The amount of sediment that reaches a stream depends on the proximity of the quarry to a stream, amount of activity that occurs within the quarry, and effectiveness of adjacent riparian areas at capturing any sediment mobilized during quarries operations. Quarries that are in riparian areas have a greater chance of transporting sediment through oversteepened fills, compacted surfaces and excavated slopes.

BMPs such as sediment fences or straw bales could be implemented to further limit sediment transport. Effectiveness of the BMPs, though, will depend on how quickly they are in place prior to use in winter. If properly designed, located, and maintained BMPs should greatly reduce or eliminate movement of sediment to streams.

Quarry use is not likely to measurably affect substrate composition. Most quarries are not located near streams and have a low probability of transporting fine sediment. Overall, the

probability of sediment transported and turbidity generated from use of existing rock quarries is low, since no rock quarries are in use adjacent to LFH.

In summary, PDCs used during road maintenance activities will contain most sediment from being transported to stream channels. However, due to the proximity of road crossings to critical habitat and ESA listed fish, there is a low probability of localized adverse impacts from road maintenance activities.

Chemical Contamination/Nutrients - Chemical contamination may occur from several road maintenance activities. Contamination may occur from equipment leaks (e.g. diesel fuel, oil, hydraulic fluids, and antifreezes) or refueling during project implementation. However, following the PDC of refueling at least 150 feet from a stream and having spill containment equipment on hand should reduce the risk of these hazards. Road work at stream crossings presents the most likely situation where a fuel spill into a live stream may occur. Past experience with road maintenance has demonstrated there is a very low probability of spilling significant amounts of fuel or oil near waterways, reducing the possibility of aquatic habitat contamination to a **discountable** risk.

Contamination may occur from wet concrete or wastewater when bridges are repaired. Spilled wet concrete and contaminated water used during curing can cause rapid pH swings, which has the potential to kill fish. The amount of impact to fish is dependent on the extent of contamination, the likelihood of fish being present near the site, a fish's ability to move out of contaminated areas and current stream pH. Most routine maintenance does not involve concrete and spills are even less frequent so overall risk to water quality should be minor (**insignificant**).

Asphalt and chip-seal used during resurfacing can leach out hydrocarbons, which can influence pH. The change in pH of water from leaching of asphalt is neutral or slightly alkaline (Legreta et al. 2005). Crushed asphalt has more surface area, which allows water to run through the asphalt. These hydrocarbons can move either across the landscape into a waterway or leach down into an aquifer. The amount of pavement repaired, its proximity to streams, and the time repairs are made will determine how much hydrocarbons reach a stream. Because routine maintenance generally patches small road segments during dry conditions, the amount of hydrocarbon leaching should not be a concern to water quality (Legreta et.al. 2005). There is no predicted change to pH to adjacent waterways from patching small holes because of the small amount proposed.

Physical Barriers - Road maintenance activities will not create physical barriers or otherwise degrade access to aquatic habitat. Culvert cleaning may improve access by removing debris that is plugging culverts and could block fish passage if left in place. Replacement of culverts on small streams may improve passage for some resident fish species; however there will be no effects to passage of ESA-listed fish because culverts on streams with ESA-listed fish cannot be replaced under this consultation.

Large Woody Debris and Pool Frequency/Pool Quality – Although the programmatic states that all large wood that is removed from a stream during culvert clean out should be returned to the stream, effects to the amount and size of wood will still persist (**negative**). Smaller wood may be placed on the banks or removed if it is mixed with sediment or other debris during the

removal process. Large wood taken from upstream of a culvert maybe placed close to streams but road and equipment limitations may limit how close to the active channel the wood may actually be placed. For example, to protect the road fill, large wood will not be placed on the immediate road fill downstream of the culvert. Heavy equipment used for road maintenance is generally restricted to operating on the road surface or shoulder. The road location and/or the "reach" of the equipment may require that the large wood is placed near a stream channel but it may not be able to directly interact with the channel. Larger pieces moved by equipment during routine maintenance or storm repair, may be broken or cut. The size and location of wood is critical, if it is to function naturally in place or downstream. Removal of LWD from stream channels has the potential to affect pool habitat characteristics. PDCs associated with the activity should result in a low probability of localized impacts to pool habitat including pool frequency and pool quality.

Streambank Condition –Streambank stability may be affected in situations where roads encroach on streams. Maintenance activities may result in a loss of riparian vegetation if the road is very close to the channel, which could cause some localized streambank stability problems.

Situations exist where stabilizing a riverbank may be necessary. However, leaving the bank alone or considering projects such as riparian planting, rootwad revetments and placement of logs or boulder diagonal to streamflow are alternatives in some situations. Use of riprap is limited to scour protection of existing bridge or culvert structures and the replacement of pre-existing rock riprap. Treatments that harden stream banks and leave them in an unnatural condition can cause channel erosion downstream and deter natural channel processes, e.g., wood recruitment (**negative**). Furthermore, bank stabilization does not address the root of the problems that created the bank erosion in the first place.

Road maintenance activities along roads that are located greater than 150' from a stream with ESA-listed fish will have no effect on streambanks where listed fish occur.

Increase in Drainage Network and Change in Peak/Base Flows – Road maintenance has a low probability of affecting flows. Typically, this activity improves water drainage from roads, and results in a minor positive effect by rerouting deflected flow paths on existing roads, allowing reinfiltration as groundwater. Work occurs on areas that already have compacted soil. A road's location, specifically hillslope position, strongly influences how much surface and subsurface flow a road intercepts. Mid- and lower-slope roads have the greatest risk of intercepting and re-routing flows.

Increases in peak flows have been related to increases in drainage network due to roads. Wemple et al. (1996) studied the effect of channel network extension on two basins in the western Cascades of Oregon and found that 57% of the road network was connected to the stream network (road segments draining to streams, or road segments draining to culvert outlets with gullies incised below them), resulting in an increased drainage density of 21-50%. They concluded that this increase in road drainage density, and enhanced water routing efficiency was a possible explanatory mechanism for the changes in hydrograph shape (i.e. earlier peak, higher volume discharge) as presented in Jones and Grant (1996). Road maintenance can substantially improve hillslope drainage by installing larger or more cross drain culverts. This can redirect

flows into their original stream course, or on to forest soils reducing the magnitude of flows before they reach a stream. How much drainage is improved depends on the number of cross drains installed, the road's grade and shape, the amount of water, and type of precipitation (rain, snow, etc.) events.

Adding cross-drain culverts may reduce the drainage network by shortening the length of road ditch that is connected to streams at stream crossings. Adding more cross-drains or waterbars displaces water off of the road surface and out the ditch to side slopes where the water can infiltrate into the soil; this in turn reduces surface flows associated with roads and can influence peak flow volume.

Riparian Reserves – Brushing along roads has the potential to cut riparian vegetation that is needed to maintain bank stability, shade, and to supply organic material to streams (**insignificant**). Brushing generally prunes or cuts sapling and seedling trees, woody vegetation such as alder and willow, and shrubs. Brushing, however, does not prune larger overstory trees that provide most shade. The PDC will help to maintain understory shading, organic material, and bank stability. However, where roads closely parallel a stream, some level of continued vegetation disturbance is likely.

Biological Effects – Short-term adverse effects of fine sediment on fish include reduced respiration efficiency due to gill irritation and reduced feeding efficiency due to poor visibility. However, effects should be short term and would not result in serious injury or death. Elevated levels of deposited sediment particles can cause habitat impacts such as loss of interstitial spaces and cover.

Replacement of culverts on small streams will have local sediment and turbidity effects. The increased stream turbidity may deposit fine coats of sediment on channel substrate a short distance downstream, encourage fish to move downstream, and alter behavior patterns for a short time. Because the work will be conducted during the in-water work periods (a time when spawning is not expected and after emergence of fry), the project should not interfere with spawning, egg development, and the sac fry life stage.

Off-Channel Habitat; Refugia; Width/Depth Ratios; Floodplain Connectivity; Road Density and Location; Disturbance History; Disturbance Regime – Road maintenance activities are not likely to affect these indicators. Actions in this category will take place on existing roads only. As a result, this will not change road density and location; or disturbance history and disturbance regime. Channel forming habitat elements, such as large wood recruitment, will not be affected by this activity. The potential effect of use of existing rock quarries is limited due to the low numbers of quarries in use near streams with LFH. By implementing the PDCs the amount of sediment from road maintenance activities should be of small magnitude and will not be sufficient to significantly affect the off-channel habitat, refugia, width/depth ratios, floodplain connectivity, road density and location, disturbance history and disturbance regime indicators.

Repair of Storm-Damaged Roads
(LAA less than 150’ from LFH; NLAA at distances greater than 150’ from LFH)

Temperature – Activities within this category that occur near streams will likely occur at sites where the riparian vegetation has already been impacted as a result of the road damage. Trees and streambank vegetation maybe displaced downstream when the culverts fail and when roads slide into streams. As a result, repair of the road usually results in little or no additional loss of vegetation. Riparian shrubs and trees may be cut and excavated to access work sites. This type of activity would only have localized effects on water temperature because of the small amount of vegetation being removed (**insignificant**). Repairs to ditch relief culverts and to fill slope failures typically affect only the road prism and will not affect vegetation providing shade to streams.

Sediment/Turbidity/Substrate - The primary purpose of the actions in this category is to stop or reduce the sediment impacts that are occurring as a result of a slope failure or failure of a portion of the road prism, be it the cutslope, a stream crossing or a fill failure. Removal of slides blocking road ditches will return flow to the ditch and prevent further erosion of the road bed. Damage to roads adjacent to streams or at stream crossings has the highest potential to continue impacting streams if repairs are not implemented immediately. Removal of large slides, replacement of culverts or relocation of roads will decrease sediment loading to streams and over time return habitat conditions to the environmental baseline if properly designed. However before such improvements can be realized, short-term sediment and turbidity increases can be anticipated with project implementation (**negative**). This can include the installation of waterbars, drain dips, and cross drains; the removal and/or placement of culverts; and the removal of slides from roads.

Repairs of cutslope and fill failures along upslope road segments may have little or no impact on water quality, particularly to streams with LFH. These sites may have no hydrologic connection or may be connected only to small headwater streams where sediments introduced into the aquatic system maybe stored within the channel before it can reach LFH. Turbidity from these sites may reach LFH.

The PDCs will help to limit sediment sources, but they may not be 100% effective. Thus short-term, localized turbidity increases are likely to result, and may be **adverse**.

Chemical Contamination/Nutrients - Chemical contamination may occur from equipment leaks (diesel fuel, oil, hydraulic fluids, and antifreezes) or refueling during project implementation. However, the PDC of refueling at least 150 feet from a stream and having spill equipment on hand should reduce these hazards (**insignificant**).

Physical Barriers – Road failures have the potential to create barriers to fish passage when culverts are plugged or displaced or slides alter channel configuration. Repairs at these sites can restore passage.

Large Woody Debris – Stream crossings are often sites where flood debris and large wood can become trapped at the upstream entrance to culverts and small bridges. Repairs at these sites

usually include the removal of the debris from above the structure. Small debris and sediments are usually removed from the site and taken to waste storage areas. LWD may be replaced back into the channel below the structure. Activities within this category that occur near streams will likely occur at sites where the riparian trees have already been impacted as a result of the road damage. Trees maybe displaced downstream when the culverts fail and when roads slide into streams. As a result, repair of the road usually results in little or no additional loss of LWD (**insignificant**). Riparian trees may be cut and excavated to access work sites.

Streambank Condition - Road failures may cause excessive erosion of streambanks when culverts are plugged or displaced, stormflow erodes banks below roads or slides alter channel configuration. Repairs can stabilize the banks at these sites.

Increase in Drainage Network – Storm damage repairs can improve road drainage by installing more ditch relief pipes or enlarging existing ones to handle larger storm events. Repairs that are successfully implemented can reduce ditchline extension and channel erosion resulting from too much water delivery.

Riparian Reserves – Most of the damage to the Riparian Reserves will have already occurred when the damage occurs to the road as a result of the fill failure and slides. Some additional removal of riparian vegetation may be necessary to provide access for equipment to make the repairs to the road. Recovery of riparian vegetation depends how much of the road is in a riparian area, the proposed treatment, and how much work is planned. Much of the repair work will occur within the existing road prism where the riparian vegetation has already been disturbed; in many cases there will be little additional disturbance outside of the road prism.

Biological Effects – Construction activities to repair road damage may have direct impacts on ESA-listed fish if the work occurs in or near streams with LFH. Storm damage generally occurs in fall and winter months when eggs, juveniles and spawning adults may be present. Increased levels of sedimentation often have adverse effects on fish habitats and riparian ecosystems. Fine sediment deposited in spawning gravels can reduce egg survival and developing alevins (Everest et al. 1987; Hicks et al. 1991) by reducing the availability of dissolved oxygen in the gravel. If the repairs involve working in the channel, such as replacing a culvert or stabilizing the streambanks, there is a high probability that disturbance to fish will occur. If the repair work can be delayed to summer there is still a high potential for disturbance to juvenile fish.

Large Pools; Pool Frequency /Pool Quality; Off-Channel Habitat; Refugia; Width/Depth Ratios; Floodplain Connectivity; Changes in Peak/Base Flows; Road Density and Location; Disturbance History; Disturbance Regime – While activities in this category are intended to reduce sediment and water quality impacts from damages to the road system, it is not likely that these habitat indicators will be affected. This is because the damages that are envisioned to be repaired under the programmatic will not be large construction projects, but rather the more routine repairs needed to keep the road system open and operational. Larger construction activities, designed to repair damage that is having larger impacts to the aquatic ecosystem, are not covered by this programmatic and require a separate consultation.

Recreation Site, Trail, and Administrative Structure Maintenance and Associated Public Use (LAA less than 150' from LFH)

Temperature - Clearing brush and felling hazard trees in riparian areas has the potential to increase solar radiation to streams. The PDCs require leaving a buffer along streams. This PDC will protect overhanging vegetation that is currently providing shade close to the stream. However, taller alders or hazard trees providing shade outside of this buffer could be cut as needed. Past experience with trail and recreation site maintenance shows that typically only a few hazard trees are cut per year at any one site or trail. Thus, the effects to water temperature should be minimal (**insignificant**) because removal of hazard trees would be localized and not remove enough trees to reduce stream shade.

Use of recreation sites may result in impacts to trees and groundcover vegetation near streams (Cole and Marion 1988) that could have site-specific **adverse** effects on temperature. Long-term trampling of streambanks can result in compacted soils where streamside vegetation cannot grow (Madej et al. 1994). Madej et al. (1994) found that bank erosion and channel width increased an average of 27% in where human use was concentrated in Yosemite National Park. Trampling of the banks and riparian vegetation were common.

Sediment/Turbidity/Substrate; Pool frequency/Pool Quality; Width/Depth Ratio; Streambank Condition – Generally trails that are located close to streams large enough to be occupied by listed salmonids have vegetated buffers between the trail and streams that will effectively trap any sediments from the trails before it reaches the streams. Stream crossings often utilize small bridges. The most likely source for sediment is when trails cross small 1st and 2nd order streams with small culverts. One potential impact to aquatic habitats with trail maintenance is sediment associated with small slide removal and tread repair. The degree of impact is dependent on the amount of ground disturbance at the site level, distance of a small slide from a stream, slope steepness, and distance to the nearest critical habitat. Tread maintenance may contribute small amounts of sediment to streams in the short term when rocks or roots are removed. Slide maintenance may also contribute sediment when material is removed and the trail tread is graded through the damaged sections. The PDCs will reduce sediment by minimizing trail berms that route water off trails, directing slough and tread disposal away from streams, and making sure drainage structures direct water and sediment away from stream crossings and fords. Sediment resulting from trail maintenance or use is likely to be minimal in general but there maybe site specific cases where the potential for higher amounts could occur, resulting in a low probability of localized **adverse** impacts.

Recreation site maintenance would not produce large amounts of sediment. Only the grading and resurfacing of graveled roads in campgrounds may produce sediment. It is predicted that low levels of sediment could reach streams and impact fish habitat. This is because riparian buffers would filter most sediment before reaching a stream, grading is generally conducted during dry conditions, and graded material would be kept out of drainage ditches where it can be transported to streams.

Use of recreation sites may result in impacts to soils and groundcover vegetation near streams (Cole and Marion 1988). Long-term trampling of streambanks can result in compacted soils

where streamside vegetation cannot grow (Madej et al. 1994) resulting in increased bank erosion and increased channel width. Madej et al. (1994) found that bank erosion and channel width increased an average of 27% in where human use was concentrated in Yosemite National Park. Trampling of the banks and riparian vegetation were common (**adverse**). Pool quality can be affected when stream widths increase and LWD is removed.

<u>Chemical Contamination/Nutrients</u> – Spills may occur during routine trail and recreation maintenance. Spills may include fuel, oil, cleaning materials or human waste associated with equipment and the pumping of toilets. The PDCs should minimize spills and their effects. Fuels and power equipment will not be staged or stored within 150' of streams. When toilets are pumped, absorbent pads and proper safety equipment will be present at all times. Fuel and oil leaks from boat motors or vehicles/trailers used to launch boats may spill or drip onto launch pads or directly into surface water (Cole and Landres 1995). Human concentrations at campgrounds may lead to impaired water quality by elevation of coliform bacteria and nutrients in streams (Spence et al. 1996). Sewage effluent may flow into the groundwater beneath recreation sites and eventually into streams (Cole and Landres 1995). Most campgrounds and day use sites have restrooms where sewage is contained in vaults to prevent groundwater contamination, and there is a low probability of localized insignificant impacts.

Pesticide-Treated Wood. Pesticide treatments in common use include water-based wood preservatives, such as chromated copper arsenate (CCA), ammoniacal copper zinc arsenate (ACZA), alkaline copper quat (ACQ-B and ACQ-D), ammoniacal copper citrate (CC), copper azole (CBA-A), copper dimethyldithiocarbamate (CDDC), borate preservatives, and oil-type wood preservatives, such as creosote, pentachlorophenol, and copper naphthenate (FPL 2000). Acid copper chromate (ACC) and copper HDO (CX-A) are more recent compounds not yet in wide use (Lebow 2004a). Withdrawal of CCA from most residential applications has increased interest in arsenic-free preservative systems that all rely on copper as their primary active ingredient (FPL 2003, Lebow 2004a) with the proportion of preservative component ranging from 17% copper oxide in some CDDC formulations, to 96% copper oxide in CA-B (Lebow 2004a).

A pesticide-treated wood structure placed in or over flowing water will leach copper and a variety of other toxic compounds directly into the stream (Weis and Weis 1996, Hingston *et al*. 2001, Poston 2001, NOAA 2003). Although the likelihood of leaching pesticides, including copper, from wood used above or over the water is different than splash zone or in-water applications (WWPI 1996), these accumulated materials add to the background loads of receiving streams. Movements of leached preservative components are generally limited in soil but are greater in soils with high permeability and low organic content. Mass flow with a water front is probably most responsible for moving metals appreciable distances in soil, especially in permeable, porous soils. Preservatives leached into water are more likely to migrate downstream compared with preservative leached into soil, with much of the mobility occurring in the form of suspended sediment.

If treated wood sawdust or shavings generated during construction are allowed to enter soil or water below at treated structure, they make a disproportionately large contribution to environmental contamination, with leaching of construction debris immersed in water being vastly greater than from solid wood (FPL 2001b, Lebow and Tippie 2001, Lebow *et al*. 2004).

Because construction debris may release 30 to 100 times more preservative than leaching, collection of construction debris should be stressed during project planning and budgeting. Storing treated wood shipped to the project area out of contact with standing water and wet soil, and protected from precipitation also significantly reduces the likelihood of chemical leaching during construction (Lebow and Tippie 2001, FPL 2001b).

Wooden bridges built without a wearing surface where vehicles ride directly on a creosote treated wood deck show wear from vehicle tracking and debris abrasion that will wear away the preservative treatment envelope over time and expose new surfaces of the wood to leaching (Brooks 2000, Ritter *et al*. 1996a and 1996b). Similarly, foot traffic will abrade treated wood used in pedestrian bridges unless prevented by a wearing surface such as synthetic mats, coatings, metal sheets, or sacrificial plywood sheets (DeVenzio undated, Lebow 2004). Cleaning and maintenance activities, such as aggressive scrubbing, power-washing, or sanding can also remove particles of treated wood and deposit them in soil or water beneath a treated wood structure (Lebow *et al*. 2004).

Application of finishes, such as semi-transparent penetrating stains, latex paint, oil-based paint, decrease environmental releases (FPL 2001a and 2001b, Lebow *et al*. 2004). Coatings minimize the loss of metals by forming a barrier between the treated wood and the environment (Stilwell and Musante 2004). In general, opaque polyurethane and acrylic finishes form the most durable coatings, presumably because of their ability to protect wood from ultraviolet radiation, although for some surfaces, particularly horizontal ones subjected to foot traffic, use of a penetrating stain that results in a slow wearing of the coating may be preferable (Stilwell and Musante 2004). Experiments to test the ability of coatings to minimize leaching from CCA-treated wood found that one coat of latex primer followed by one coat of oil-based paint or two coats of penetrating, water-repellent deck stain were both effective for reducing the leaching of copper, arsenic and chromium by more than 99% (FPL 2001a). This requires that they be applied to the in-service structure, directly over aquatic or other sensitive environments. Coatings and any paint-on field treatment must be carefully applied and contained to reduce contamination (Lebow and Tippie 2001, FPL 2001b). These surface treatments may need to be reapplied annually or biannually for continued water-repellant protection. Because it is very difficult to apply these finishes without dripping or spillage into the environment below the structure, these hand-applied finishes are not recommended for treated wood used in sensitive applications (Lebow and Tippie 2001). Wood treated with oil-type preservatives, such as creosote, pentachlorophenol, and copper naphthenate, maybe difficult to paint, stain, or seal. However, because of their oily nature, these preservatives also act as water repellants and can help to prevent checking and splitting (Lebow and Tippie 2001).

Evaluation of in-service structures show that leaching rates vary by wood dimensions, wood species, treatment practices, fixation, age of the structure, type of exposure, construction and maintenance practices, and site-specific conditions (Lebow 1996, Lebow *et al*. 2004). Brooks (2004) reported significantly more copper (13.9 micrograms per gram of dry sediment) below the center of an ACZA four-piling dolphin placed in a rural area than at the subtidal reference site (6.4 micrograms per gram of dry sediment). Three other sites tested did not show significant differences. That amount of copper meets Washington State sediment quality standards but exceeds 8.2 micrograms per gram of dry sediment, the amount where, according to NOAA

Screening Quick Reference Table for Inorganic Solids ("SQuiRTS"), toxic effects in sensitive species may be expected.

Copper is a widespread source of water pollution in salmon habitat where it is deposited by mines, urban stormwater runoff, treated wood leachate, and from algicides used in waterways and as fungicides applied to cropland (WWPI 1996, Weis and Weis 1996, Baldwin *et al*. 2003, Weis and Weis 2004). Copper is the most frequently detected trace element at agricultural and mixed use sites in the Willamette River Basin (Wentz *et al*. 1998). Metals leached into sediments near CCA-treated wood in aquatic environments have been shown to accumulate in organisms, including epibiota and benthic organisms (Weis and Weis 2004). Other animals can acquire elevated levels of these metals indirectly through trophic transfer, and may exhibit toxic effects at the cellular level (DNA damage), tissue level (pathology), organismal level (reduced growth, altered behavior and mortality) and community level (reduced abundance, reduced species richness, and reduced diversity) (Weis *et al*. 1998, Weis and Weis 2004). Effects are more severe in poorly flushed areas and in areas where the wood is relatively new, and reduces after the wood has leached a few months (Weis and Weis 2004).

Wood impregnated with other chemicals such as copper, zinc, arsenic and chromium may directly affect salmon that spawn, rear, or migrate by those structures, or indirectly when the salmon ingest contaminated prey (Posten 2001). Copper has been shown to impair the olfactory nervous system and olfactory-mediated behaviors in salmonids (Hara *et al*. 1975, Winberg *et al*. 1992, Hansen *et al*. 1999a and 1999b, Baldwin *et al*. 2003). Salmon will actively avoid copper (Hansen *et al*. 1999a and 1999b), suggesting that low levels of copper present in distinct gradients, such as near a point-source discharges, may act as migratory barriers to salmon. However, behavioral avoidance is not likely to be an adequate defense against non-point sources of copper in lakes, rivers and estuaries (Baldwin *et al*. 2003).

Even transient exposure lasting just a few minutes to copper at levels typical for surface waters from urban and agricultural watersheds, and within the U.S. Environmental Agency water quality criterion for copper, will cause greater than 50% loss of sensory capacity among resident coho in freshwater habitats (Baldwin *et al*. 2003). While that loss may be at least partially reversible, longer exposures lasting hours have caused cell death in the olfactory receptor neurons of other salmonid species (Julliard *et al*. 1996, Hansen *et al*. 1999b, Moran *et al*. 1992). Therefore, olfactory function will be impaired if salmon are unable to avoid copper pollution within the first few minutes of exposure and, if copper levels subsequently exceed a threshold for sensory cell death, it may take weeks before the functional properties of the olfactory system recover (Baldwin *et al*. 2003). Because olfactory cues convey important information about habitat quality (*e.g.*, pollution), predators, conspecifics, mates, and the animal's natal stream, substantial copper-induced loss of olfactory capacity is likely to impair behaviors essential for the survival or reproductive success of salmon and steelhead (Baldwin *et al*. 2003).

PAHs are commonly released from wood treated with creosote. PAHs may cause cancer, reproductive anomalies, immune dysfunction, growth and development impairment, and other impairments to exposed fish (Johnson *et al*. 1999, Johnson 2000, Stehr *et al*. 2000, Collier *et al*. 2002, Johnson *et al*. 2002).

Some campgrounds, day use sites and trails have small bridges, primarily footbridges, or boardwalks that cross streams or wetland areas where the use of treated wood is necessary. If these structures occur over or near habitats occupied by listed fish there is a potential for **adverse** effects.

Large Woody Debris – Trail and recreation site maintenance can affect instream wood by creating smaller, more mobile pieces when blowdown trees are cut to allow passage along streamside trails. The PDCs should lessen these effects to streams. Where it is safe and feasible, blowdown trees will be left intact producing a larger piece with an attached rootwad. This could provide greater structural and habitat stability to streams depending on the stream's size. However, it may only be safe and feasible to move a small percentage of blowdown. Past experience has shown that fallen trees are either too large or too far from a road to use heavy equipment to remove them from the trail.

Removal of hazard trees within developed recreation sites is required for safety reasons. Dead trees or trees that are partially blown over in recreation sites may fall and kill or injure people visiting the site. Removal of hazard trees from within and near riparian areas will reduce the amount of large wood that could potentially fall into streams or onto floodplains. When possible, hazard trees will be left lying on the ground where they may still interact with the channel. However, some downed trees may need to be removed because they block roads and camp/picnic sites. Downed trees themselves may be safety hazards if people walk or play on or around them and therefore will be removed from areas of easy public access. The impact of hazard tree removal in recreation sites tends to be a cumulative problem because while trees are removed infrequently, over the long-term safety concerns will require that all trees that are falling hazards be felled and most likely removed. The result is reduced large wood recruitment and a reduction of large wood on floodplains and channel (**adverse**).

Riparian Reserves - Brushing on trails and in recreation sites along streams has the potential to cut riparian vegetation needed to maintain bank stability, shade, and organic material in streams. Brushing generally prunes or cuts sapling and seedling trees, woody vegetation such as alder and willow, and shrubs. Brushing, however, does not prune larger overstory trees that provide most shade. PDCs would provide brushing buffers along streams. This requirement will help to maintain vegetation to meet understory shading, nutrient, and bank stability needs.

Use of recreation sites may result in impacts to soils and groundcover vegetation near streams (Cole and Marion 1988). Long-term trampling of streambanks can result in compacted soils where streamside vegetation cannot grow (Madej et al. 1994).

Biological Effects – Public use is concentrated at recreation sites. Degradation of riparian vegetation and streambanks, loss of large wood and sediment can all have effects on fish. Direct effects may occur from fishing, wading and swimming, and other play activities in the water. At high use sites the disturbances may be great enough to cause fish to move to other stream sections, resulting in a low probability of localized **adverse** impacts.

Physical Barriers; Large Pools; Off-Channel Habitat; Refugia; Floodplain Connectivity; Changes in Peak/Base Flows; Increase in Drainage Network; Road Density and Location;

<u>Disturbance History; Disturbance Regime</u> – Since there is no causal mechanism that could influence these indicators, these habitat indicators are not affected by activities in this category.

<u>Fisheries Program Surveys (LAA less than 150' from LFH)</u>

<u>Biological Effects</u> - Activities associated with some types of surveys and monitoring can "disturb" or "stress" adult/juvenile fish or crush eggs/fry buried in the gravel. PDCs (redd identification, proper training, and coordination) should reduce these risks, but will not eliminate them completely. Energy expended by juvenile salmonids reacting to surveyors may result in reduced growth and development. A decrease in available energy stores may also reduce their effectiveness in competing for food and defending territories. Disturbing or "spooking" adult fish while spawning can result in reduced reproductive success through either prevention of redd (nest) establishment, displacement of adults to less suitable habitat, creation of poorly constructed redds or excess energy expenditure resulting in pre-mature death of spawning adults. Although such surveys and monitoring may cause incidental "take" of individual fish, it is unlikely they would adversely affect entire fish populations or runs at any scale.

<u>Temperature; Sediment/Turbidity; Chemical Contamination/Nutrients; Physical Barriers; Substrate/Sediment; Large Woody Debris; Large Pools; Pool Frequency /Pool Quality; Off-Channel Habitat; Refugia; Width/Depth Ratios; Streambank Condition; Floodplain Connectivity; Changes in Peak/Base Flows; Increase in Drainage Network; Road Density and Location;Riparian Reserves; Disturbance History; Disturbance Regime</u> – These habitat indicators will not be affected by activities in this category since the most likely impacts would result from a person(s) walking in or near streams.

<u>Environmental Education Programs (LAA less than 150' from LFH)</u>

<u>Riparian Reserves</u> – Sites used for large groups of children may have some damage to riparian vegetation but this effect is likely to be minimal and only impact vegetation such as shrubs and grasses. The effects to this indicator will be **negligible**.

<u>Biological Effects</u> - Aquatic-oriented environmental education programs often include activities that occur in-stream, such as water quality sampling, invertebrate sampling and allowing children to observe spawning salmon. Field trips to observe spawning salmon at any particular site occur once or twice a week during the fall. These activities may disturb juvenile fish and have a potential to disturb spawning adults. Children are not allowed to enter the water except near the stream's edge and are kept away from spawning adults, but spawning adults close to the stream edge may be **adversely** disturbed.

<u>Temperature; Sediment/Turbidity; Chemical Contamination/Nutrients; Physical Barriers; Substrate/Sediment; Large Woody Debris; Large Pools; Pool Frequency /Pool Quality; Off-Channel Habitat; Refugia; Width/Depth Ratios; Streambank Condition; Floodplain Connectivity; Changes in Peak/Base Flows; Increase in Drainage Network; Road Density and Location; Disturbance History; Disturbance Regime</u> – These habitat indicators will not

be affected by activities in this category since the most likely impacts would result from a person(s) walking in or near streams.

Pump Chance/Helipond Maintenance and Use (LAA less than 150' from LFH)

Temperature – Streamside trees and shrubs may be brushed or cut to provide better access to drafting sites and to remove hazard trees. Removal of riparian vegetation would be minimal in streams along roadside pullouts. Effects to water temperature would be **negligible** because of the localized removal of vegetation that shades the stream.

Sediment/Turbidity/Substrate - The risk of mass wasting due to pump chance maintenance and use is low. Maintenance would not build new roads or undercut existing slumps and slides. The risk of increased surface erosion occurring from maintenance and use depends on how much disturbance occurs along the banks of the streams and within the riparian area. In general, the amount of sediment generated at pump chance sites is likely to be negligible. The greatest potential for increasing turbidity is from the deepening of pump chances, however most pump chances are located at larger pools and excavation is not needed. Turbidity increases will depend on how much material is being excavated and how much fine material already exists in the streambed. Sites needing extensive excavation with abundant fine sediment could see turbidity plumes hundreds of feet downstream, while in other situations turbidity plumes may be seen only for a few feet. Fine sediment would likely settle just downstream of the excavated site, but could travel a great distance if fine textured soils or steep channel gradients are present. It is not likely that turbidity increases would change overall substrate composition. In either situation excavation would be limited to the low flow period and turbidity increases are likely to be short term, lasting no more than a few minutes to hours. There is a potential for water spills to occur when pumper trucks are being filled that may cause short-term, localized increases in turbidity if the spilled water reaches the stream channel. Most pump chances are used very infrequently and may not be used for many years in a row. Overall, there is a low probability of localized **adverse** impacts.

Chemical Contamination/Nutrients - Heavy equipment working in streams or along stream banks and refueling of pumps can present a potential hazard if fuel or oil leaks into streams. However, the PDC of refueling at least 150 feet from a stream and having spill equipment on hand should reduce these hazards. Operation of pumper trucks at pump chance sites can also present a potential hazard if fuel or oil leaks into streams.

Physical Barriers – Pump chances along larger streams, rivers and in ponds do not require barriers to pond water because drafting sites can be easily found. In smaller streams, that lack deeper habitat, small dams may be built to pond water to pump directly into a truck or a temporary basin along a road. However, use of temporary dams is infrequent because they are time consuming to construct and do not always provide enough water to meet demands. When dams are used they have the potential to block resident fish passage if they extend across the entire channel or direct flows into an existing pool. Dams can be in place for several hours or days depending on the amount of water needed. Since most dams are constructed in smaller perennial channels, the possibility of blocking fish passage is reduced, but not eliminated. Such

temporary dams are most common in small headwater streams and are rarely used in streams with ESA-listed fish. Overall, there is a low probability of localized **adverse** impacts

Large Woody Debris – Effects to wood debris would occur when hazard trees are cut along spur roads, when nearby trees are cut for helicopter access and safety and when inchannel debris is moved to excavate a pool. Overall effects to wood should be minimal (**insignificant**) because few hazard trees are cut at each site, sites comprise a small portion of the overall riparian areas, and cut trees will be left on site.

Pool Frequency/Quality – Pump chance use and maintenance affects pools in two ways. Either pools are altered when they are excavated or the volume of water can decrease when they are pumped. Pool excavation generally occurs in small perennial streams, but sometimes can occur in larger fish-bearing streams. The frequency of excavation depends on if the chance is a primary pumping site and how quickly the site fills with bedload. Site in larger fish bearing streams are usually located next to large pools where excavation is not needed.

Effects from excavation can vary greatly depending on if the pool is naturally or artificially maintained. Natural pools can maintain their shape and size as long as the features that created the pool remain and excessive bedload does not bury it. Excavation may change channel hydraulics by moving channel roughness elements and deepening/widening the pool. These changes can make a pool smaller and shallower over time or may even completely change features enough that the pool is lost. If channel roughness elements are not drastically changed, excavation can deepen and enlarge a pool. However, this may still disturb instream cover such as large substrate and wood. It may also decrease pool tailout area and spawning habitat.

Many pump chance pools are maintained by artificial structures such as culverts, gabion baskets, boulder weirs, small check dams, excavation, or a combination of these. Maintaining a pool at a culvert site will not change the hydrologic control, but will change a pool's size, smaller inchannel features and a pool's tailout. Maintenance at gabion or check dam sites will cause additional effects such as bank erosion and localized aggrading around each structure.

Streambank Condition – Pump chance excavation may cause minor bank erosion around the deepened pool at some natural and artificial sites. Removal of streambank vegetation may be needed to provide access to the channel and could result in minor (**insignificant**), localized alteration of the banks.

Change in Peak/Base Flows – The PDC requirements should prevent complete habitat dewatering. However, flows and habitat may still be reduced downstream from the water removal. The amount of habitat decrease will depend on the rate of flow, how much is withdrawn, and how long it is withdrawn. Larger streams and rivers may see only slight water level drops even when large amounts are withdrawn. Smaller streams, however, could see shallower riffles and pools leading to the temporary loss of margin habitat and instream cover.

Riparian Reserves - Streamside vegetation would be brushed to maintain access to fire sumps. The amount of brushing depends on the type of pump chance. Some chances are accessed via road pullouts. These sites generally need the pullout brushed and a route to lay a hose to the stream or pond. Most pullouts require minimal brushing because they are maintained from

continued use of the road. Hose lays to streams require a narrow path of vegetation brushed so the hose lays flat. The distance brushed is generally less than 75 feet. Chances along larger streams or rivers and to ponds may need an access road where pumper trucks can back. Access roads are generally short spurs. The majority of this work would include brushing previously cleared areas with few, if any, larger trees removed. Riparian vegetation cleared could include; willows, alders, and big leaf and vine maple. Clearing of any vegetation will prevent some riparian vegetation from growing along stream banks and in riparian areas.

Biological Effects - There is a potential that small fish can be impinged against screens when water is withdrawn (**adverse**). Pumps will have screens that meet NMFS standards when used at sites with ESA-listed fish. Some administrative units require that water pumps be placed in caged structures to off-set the potential for fish entrapment in the pump.

Large Pools; Off-Channel Habitat; Refugia; Width/Depth Ratios; Floodplain Connectivity; Increase in Drainage Network; Road Density and Location; Disturbance History; Disturbance Regime – Since there is no causal mechanism that could influence these indicators, pump chance use and site maintenance is not likely to affect these indicators.

Road Prism Salvage and Road-side Hazard Tree Removal (LAA less than 150' from LFH with 50% canopy closure, NLAA greater than 150' from LFH with 50% canopy closure)

This category includes removal and/or felling of trees that have fallen into roads or rights-of-way of roads and felling and/or removal of trees along roads that are a danger to public safety. This activity occurs when trees fall due to wind, insect kill or other natural events, and when there is natural tree mortality and falling trees endanger humans and public property. This may include as few as one tree or small pockets of trees adjacent to roads.

Temperature – Hazard trees may be felled within 150 feet adjacent to LFH. Stream temperatures can increase when adjacent vegetation is removed (Spence et al 1996). Potential to affect stream temperature is dependent on proximity of the road to the stream and the number of trees removed. Based on consultation history the past five years it is likely that few trees will be felled. Trees removed from the road prism, already down from a natural event such as a windstorm, will not have any affect on temperature. (**insignificant**)

Sediment/Turbidity/Substrate - The limited nature of activities included in this programmatic category and PDCs will prevent most negative effects from sediment. Activities only allow for the sale and/or removal trees that fall in the road's prism and equipment should not need to be operated off the road. Indirect effects to sediment and turbidity may occur as a result of transporting (haul) logs from the site. The amount of wood salvaged will range from one tree up to a few truck loads and the effects from hauling would be negligible. Yarding and collection of logs may result in some localized ground disturbance that could increase sediment into road ditches that empty into streams.

Large Woody Debris - Removal of LWD from the road prism will not affect LWD levels in streams. Removal of hazard trees from within 150' of streams with LFH may remove a tree that

has the potential to fall into the stream, depending on the distance the tree is from the stream and its angle of lean (**negative**). Once felled, hazard trees that fall on to roads are treated as other down trees on roads. Future large wood recruitment may be affected (**adverse**).

Riparian Reserves –The greatest effect to riparian forests and streams likely occurred when the road was constructed and from subsequent maintenance. The programmatic only allows that portion of a fallen tree in the road prism when outside of riparian areas to be removed. Because a fallen tree can't be taken outside the road prism, disturbance to riparian vegetation should be limited to only that area where the tree is cut and moved (**insignificant**). This disturbance would be far less than what occurs from annual road brushing in the same area.

Chemical Contamination/Nutrients; Physical Barriers; Large Pools; Pool Frequency/Quality; Off-Channel Habitat; Refugia; Width/Depth Ratios; Streambank Condition; Floodplain Connectivity; Change in Peak/Base Flows; Increase in Drainage Network; Road Density and Location; Disturbance History; Disturbance Regime; Biological Effects to Fish; – Since there is no causal mechanism that could influence these indicators, road Prism Salvage and Road-side Hazard Tree Removal is not likely to affect these indicators.

Miscellaneous Special Use Permits and Leases (NLAA)

Special use permits can cover a wide range of activities. For example, permits are issued for recreational activities such as renting government-owned cabins, lookouts, and barns; camping and picnicking sites used by permittees; group events; outfitter/guide activities; and recreational residences (summer homes). Permits are also issued for commercial activities such as stockpile sites for sand and gravel; facilities for radio, cell phone, and microwave communication sites; and water gauging stations. Only actions with discountable or non-measurable effects are covered by this BA. Actions that would result in more than discountable or insignificant effects to listed fish will be addressed in separate consultations.

Temperature – Recreational residences, most of which were built many years ago, are often located adjacent to streams and lakes. While the structure (home) is typically privately owned, the land under and around the structure is government owned. Homeowners are not allowed to remove vegetation unless permitted by the government. Trees or snags near a residence may become hazardous to the structure and its occupants and for safety must be felled. Falling of hazard trees may open the canopy along the stream and subject the stream to increased solar radiation. Typically, the number of trees that need falling at any particular site is small (often only 1-2). Due to the scattered location of summer homes, and because tree falling only occurs sporadically, the effect of this activity will often be **negligible**.

Sediment/Turbidity/Substrate – Stream turbidity and sediment could occur at stockpile sites when sand and gravel is loaded, unloaded, and hauled or from the construction and enlargement of pads for communication sites. Most permitted stockpile sites are in existing rock quarries. The amount of sediment that reaches a stream depends on the location of the quarry and the amount of activity that occurs within it. Quarries that are in riparian areas have a greater chance of transporting sediment than those outside of riparian areas connected by ditchlines.

Sediment from communication sites has a low probability of reaching a stream. Almost every site is on top of a ridge or mountain to enhance the communication signal, thus very few sites are in riparian areas.

<u>Chemical Contamination/Nutrients</u> - Chemical contamination may occur from equipment leaks or refueling. The transport of contaminants to streams depends on the quantity spilled, type of contaminant, soil type, and proximity to water. Since most use is likely to occur in the dry season, it is unlikely spills would be carried to streams by surface water or ground water (**discountable**). Instead, contaminants will be localized to the soil surrounding the spill.

Chemical contamination can also result from septic systems associated with cabins, solid waste sites, and recreational and group use of other sites. All summer home cabins and recreation site waste management facilities must comply with local county ordinances, including acceptable waste management. Maintenance or replacement of existing septic systems is allowed. All special use permits require proper disposal of human waste and waste water by carrying it out of remote sites, disposing it or burying it away from water sources, or directing visitors to use existing facilities.

<u>Large Woody Debris</u> – Maintenance around gauging sites may require the movement of wood near intake pipes or the gage plate. To meet the programmatic, impacts to wood must be negligible. This suggests that wood must either be moved downstream without cutting or if cut, cutting only a few smaller pieces so it can be moved. Any greater effects would be outside the programmatic consultation. Removal of hazard trees near recreational residences located along streams may affect potential wood recruitment at the site. This activity typically occurs sporadically in isolated locations and should normally have only minimal effects on overall wood levels in streams (**insignificant**).

<u>Riparian Reserves</u> - Streamside vegetation may be brushed to maintain access to some gauging stations. Brushing is mostly needed to access the stilling well and gage plate, but trails can be brushed as well. Brushing generally involves handclipping vegetation in localized areas, never removing enough vegetation to reduce streamside shading or bank stability. Riparian vegetation can also be disturbed as a result of recreation activities associated with permits. Vegetation disturbance is likely to be limited to trampled grasses, forbs, and shrubs. This is not likely to have a significant impact upon riparian vegetation conditions (**insignificant**).

<u>Physical Barriers;</u> <u>Large Pools</u>; <u>Pool Frequency/Quality</u>; <u>Off-Channel Habitat; Refugia</u>; <u>Width/Depth Ratios</u>; <u>Streambank Condition</u>; <u>Floodplain Connectivity</u>; <u>Change in Peak/Base Flows</u>; <u>Increase in Drainage Network</u>; <u>Road Density and Location</u>; <u>Disturbance History;</u> <u>Disturbance Regime</u>; <u>Biological Effects to Fish</u>; – Since there is no causal mechanism that could influence these indicators, Miscellaneous Special Use Permits and Leases is not likely to affect these indicators.

<u>Commercial Rafting Permits (LAA)</u>

Commercial rafting permits are issued to fishing guides, whitewater rafting companies and canoe and kayak clubs. Permits may include commercial activities over a season or single events such

a weekend rafting race. PDCs require special use permit applications be evaluated by fishery biologists to assure stipulations are included in the permit that reduce or minimize disturbance to ESA listed fish, and impacts to riparian areas and water quality.

<u>Sediment/Turbidity</u> – Surface water recreating (rafting, drift boat fishing, kayaking) impacts streambanks when boats are launched. When a streambank is used repeatedly for put in and take out of boats there is a potential for vegetation trampling resulting in bare and exposed soils. There is a high probability of sediment transported into fish bearing waters. PDC stipulate designation of launch and take out locations to minimize the area of disturbance. Drift boats and other larger water craft use developed launch sites. Use of designated launch and take out sites by surface water recreation outfitters and guides should minimize direct and indirect sediment effects.

<u>Chemical Contamination/Nutrients</u> – There is a potential for human waste to affect water quality. PDCs requiring portable restrooms or other appropriate disposal of human waste will minimize the effect.

<u>Streambank Condition</u> – Localized bank erosion may occur from permitted activities in riparian areas, such as a raft put in/take out locations. To meet the programmatic, effects need to be small enough that they do not result in severe stream bank erosion, significant riparian damage or changes to channel substrate.

<u>Biological Effects</u> - Activities associated with surface water recreating can “disturb” or “stress” adult and juvenile fish. Effects from some of these activities are directly related to the permitted activity while others are indirect effects (**adverse**).

Water related recreation can result in both the disturbance of adult and juvenile fish and the direct mortality of eggs and pre-emergent fry. Most swimming and wading (non-fishing) takes place in areas where there are sand or gravel beaches, adjacent to a large pool. Disturbance of juveniles is most common along shorelines, where fry congregate in the shallows. Disturbance of older age class juveniles and adults, including over-summering adult chinook salmon and steelhead, can occur when rafting or kayaking travels over holding pools. The use of the pools by adult fish is known to occur but the importance of an individual pool during a given year is unknown.

<u>Temperature;</u> <u>Physical Barriers;</u> <u>Substrate/Sediment;</u> <u>Large Woody Debris</u>; <u>Large Pools</u>; <u>Pool Frequency/Quality</u>; <u>Off-Channel Habitat;</u> <u>Refugia</u>; <u>Width/Depth Ratios</u>; <u>Floodplain Connectivity</u>; <u>Change in Peak/Base Flows</u>; <u>Increase in Drainage Network</u>; <u>Road Density and Location</u>; <u>Riparian Reserves; Disturbance History;</u> <u>Disturbance Regime;</u> Since there is no causal mechanism that could influence these indicators, commercial rafting permits are not likely to affect these indicators.

Telephone Line and Power Line/Right-of-Way Renewal Special Use Permits (LAA less than 150’ from LFH)

There are four primary components associated with telephone and powerline maintenance. These are road maintenance, pole replacement, vegetation maintenance, and underground cable replacement. This programmatic category covers smaller telephone lines (residential) and powerlines (residential and commercial), not authorized by rights-of-way or Federal Energy Regulatory Commission permits. The effects discussion will be limited to these types of activities. Effects from road maintenance activities under special use permit have been included under the general road maintenance category.

Temperature – Power and telephone lines require vegetation to be cleared from the center of the line to a set distance (usually 10 to 50 feet either side of the line). Telephone lines and smaller spur powerlines along roads may require vegetation removal only along one side of the line. Vegetation is cleared on a set rotation usually once every 5 to 10 years. All vegetation that poses a risk to the line is controlled within a set clearance determined by the company. Vegetation can be controlled by removing limbs, hazard trees, and brush.

Clearing of brush and trees in riparian areas may increase solar radiation to streams and the forest floor. The PDCs require that brushing not occur within 10 feet of intermittent or ephemeral streams and 20 feet of perennial streams. This PDC will protect overhanging vegetation that is currently providing shade close to the stream. However, trees providing shade within and outside of this buffer would be limbed or topped as needed. The precise effects to water temperature will depend on how close to the stream trees are treated, how many trees are treated at a given site, and how much vegetation is currently available to shade the stream at the site and subwatershed scales. Lines within riparian areas of a stream that are several miles long could increase peak summer temperature and decrease nighttime winter temperature along the distance cleared (**negative**). Lines that do not closely parallel streams for a great distance are likely to have more localized effects on temperature, but would not add to cumulative effects over the subwatershed scale.

Sediment/Turbidity/Substrate – Repair and maintenance of underground cables may require excavation. Most cables run alongside a road in the road right-of-way. This means the cable could have been buried either in the road’s fill slope or next to the road. If located next to the road, the cable would have been placed in an excavated trench built across the forest and smaller stream channels, but attached to bridges when crossing larger channels.

Soil disturbance would result from excavating the ditch to maintain the line. The amount of fine sediment and turbidity that reaches a stream would depend on the time of year maintenance is conducted, how much line needs to be excavated, how much is excavated in a ditchline or across a stream channel, and what BMPs are in place. It is assumed most maintenance would be completed in the summer and that appropriate BMPs (silt fences, hay bales, and seeding) would be implemented. Following these assumptions, excavation of a line located in a road’s fill slope would likely have only localized sediment increases to streams which would not substantially increase turbidity. Excavation in a ditchline, that crosses several streams, may result in increased sedimentation and turbidity even if BMPs are applied. Storms may mobilize disturbed soils if

the site has not had time or been properly vegetated. Turbidity increases could last a few hours to days depending on the amount of soil disturbance at the site (**negative**).

Maintenance or replacement of poles can increase turbidity depending on the type of access needed to reach each site. Poles away from a main road will be maintained by a helicopter or smaller equipment (truck, ATV, and backhoe) traveling over secondary roads and trails. Poles alongside a road would be maintained by a boom truck and excavator. Little sediment is likely from the pole replacement itself because the excavated hole is small and disturbance is localized. Sediment and turbidity would likely come from accessing the site.

Line maintenance is not likely to measurably affect substrate composition. As described under turbidity, some sediment may enter streams from road maintenance, pole replacement, and excavation of buried cables. The amount of sediment is likely to be small and of short duration, but could impact a stream directly (**adverse**).

Chemical Contamination/Nutrients - Heavy equipment (chipper, bucket and collection trucks) and chainsaws working near streams can present a potential hazard from leaks and spills. However, the PDC of refueling at least 150 feet from a stream and having spill equipment on hand should reduce these hazards.

Large Woody Debris – Wood can be influenced by the limbing, topping, or removal of hazard trees near the line. Lines that are established have likely been cleared of larger trees and wood. If streams cross or parallel these routes, it is quite probable they also lack large wood to maintain aquatic habitat. The PDCs should help to maintain more and larger wood than what has fallen in the past. However, topping, limbing, and falling trees without rootwads would still decrease the stability and size of wood in larger bankfull width channels.

Large Pools, Pool Frequency and Quality – Limbing, topping, or removing hazard trees near lines can influence pool size and frequency. Lines that have been established for years may be near streams that lack wood to form stable pools. Line corridor widths are generally less than twenty feet, and there are rarely more than one stream crossing corridor in a fifth field watershed. The overall magnitude of openings created by corridors is low, and impacts to large wood are low.

The PDCs should help to maintain larger wood than what has fallen in the past. However, topping, limbing, and falling trees without rootwads could still decrease wood stability and pools. The degree to which maintenance affects pool size and frequency will depend on a channel's width in relation to cut piece's length; how pools are formed given the stream type and how much wood within 150' is affected; typically the magnitude of this effect will be negligible.

Streambank Condition – Stream banks may be excavated when underground cables are maintained. Excavated trenches are usually small (approximately 6-8" wide and up to ten feet deep), resulting in localized bank erosion **(negative**). Excavation is not required over large streams because cables are attached to bridges or are buried in the roadbed.

Riparian Reserves – Riparian vegetation varies from openings with smaller shrubs and trees to thinned forest where streams frequently cross or parallel a line. The PDCs should help to protect

riparian vegetation more than past practices. However, topping, limbing, and falling trees would continue to influence stand structure and appearance. The degree to which maintenance affects riparian vegetation would depend on how close the line is to a stream and over what distance it parallels it. In general, areas underneath powerline corridors are in an early successional condition, and it is likely powerline corridors will remain in an early successional condition.

Physical Barriers; Off-Channel Habitat; Refugia; Width/Depth Ratios; Floodplain Connectivity; Change in Peak/Base Flows; Increase in Drainage Network; Road Density and Location; Disturbance History; Disturbance Regime; Biological Effects to Fish; – Since there is no causal mechanism that could influence these indicators, Telephone Line and Power Line/Right-of-Way Renewal Special Use Permits is not likely to affect these indicators.

Special Forest Products (NLAA)

Because only NLAA actions in this programmatic category are covered by this BA/BO, effects of those actions on listed fish are likely to be insignificant and discountable. LAA action would be addressed in a separate consultation.

Large Wood Debris – Agency guidelines do not allow the removal of trees, snags or down wood from stream channels and riparian areas. However, there are situations where a firewood permit may be issued for downed tree in a riparian area adjacent to a road. These situations are typically isolated events, both temporally and spatially, that may affect instream wood at a site scale, but are likely to have negligible effects on instream wood at reach or watershed scale.

Riparian Reserves - The effects from the collection of special forest products vary by what is collected, and the extent and location of the collection. For example, the collection of mushrooms, greenery (boughs, leaves, fern fronds, vine maple, salal, and huckleberry), ferns, cascara peelings, grasses, burls, and cones generally creates minimal soil or vegetative disturbance. In addition, PDCs and additional guidelines should protect riparian areas. Therefore, their collection should have little effect to streams or riparian vegetation.

The collection of firewood and Christmas trees, on the other hand, can create localized areas of disturbance when trees or downed wood are cut and moved. However, to be included in the programmatic BA, all PDCs and effects threshold must be met. These requirements, in addition to those in the Northwest Forest Plan, would adequately protect streams from the removal of downed wood and recruitment trees.

Temperature; Sediment/Turbidity; Chemical Contamination/Nutrients; Physical Barriers; Substrate/Sediment; Large Pools; Pool Frequency/Quality; Off-Channel Habitat; Refugia; Width/Depth Ratios; Streambank Condition; Floodplain Connectivity; Change in Peak/Base Flows; Increase in Drainage Network; Road Density and Location; Disturbance History; Disturbance Regime; Biological Effects to Fish; – Since there is no causal mechanism that could influence these indicators, collection of special forest products is not likely to affect these indicators.

Bull Trout: Population Size and Distribution

Effects to habitat indicators displayed earlier in this document indicate that the implementation of the proposed activities may have effects to the temperature, turbidity, chemical contamination, substrate, large wood, pool frequency, large pools, width/depth ratio, streambanks, drainage network, Riparian Reserves and peak/base flows indicators. No effects are likely to the off-channel, floodplain, disturbance history and disturbance regime indicators. Activities such as road maintenance and repair of storm damaged roads may cause localized effects to turbidity and substrates that are more than insignificant. However these effects are mitigated by the very low amount of activities in these categories that is anticipated near bull trout spawning streams. Road maintenance and repairs can also have a positive long-term impact on bull trout habitat by reducing road and storm related erosion.

Because effects to the habitat and watershed indicators will be minimized near bull trout spawning streams, it is unlikely that spawning habitat will be affected by this action, as such; reproductive success will not be affected. The project is not likely to result in any mortality of bull trout; consequently, the population size should not be affected. In addition, because effects to barriers are neutral and the population size should remain stable upon implementing these actions, no changes in the distribution of bull trout within the action area are anticipated. Effects to the population size and distribution indicator are **neutral**.

Bull Trout: Growth and Survival

Growth and survival of all life stages of bull trout are directly correlated with the quality of numerous habitat attributes. The minor effects (both spatially and temporally) to all habitat indicators of any affected reaches within the Willamette or Hood River basins, should not be of the magnitude that associated growth rates are decreased or that survival is compromised. This project will have an **insignificant** effect to the growth and survival indicator.

Bull Trout: Life History Diversity and Isolation

Some migratory bull trout populations have exhibited the ability to convert from fluvial to adfluvial (migration to a lake or reservoir to mature) life history forms where large dams have formed reservoirs. Examples of bull trout populations that exhibit this behavior within the action area of this project include the South Fork McKenzie River population above Cougar Dam in the Willamette River Basin and the Laurence Lake population above Clear Branch Dam in the Hood River Basin. Although some negative effects to habitat indicators (as documented in above sections of this document) are possible, these effects are insignificant, or if more than insignificant, they will tend to be local and transitory. There is no causal mechanism to influence a change in the life history strategy adapted by the local bull trout populations and therefore, any effect is entirely **neutral**.

Multiple local populations distributed and interconnected throughout a watershed provide a mechanism for spreading risk from stochastic events (Hard 1995; Healy & Prince 1995; Rieman & Allendorf 2001; Rieman & McIntyre 1993; Spruell *et al.* 1999). Current patterns in bull trout distribution and other empirical evidence, when interpreted in view of conservation theory, indicate that further declines and local extinctions are likely (Dunham & Rieman 1999; Rieman

& Allendorf 2001; Rieman *et al.* 1997; Spruell *et al.* 2003). Based in part on guidance from Rieman and McIntyre (1993), bull trout core areas with fewer than five local populations are at increased risk of extirpation; core areas with between 5 to 10 local populations are at intermediate risk of extirpation; and core areas which have more than 10 interconnected local populations are at diminished risk of extirpation.

Maintaining and restoring connectivity between existing populations of bull trout is important for the persistence of the species (Rieman & McIntyre 1993). Migration and occasional spawning between populations increases genetic variability and strengthens population variability (Rieman & McIntyre 1993). Migratory corridors allow individuals access to unoccupied but suitable habitats, foraging areas, and refuges from disturbances (Saunders *et al.* 1991). The proposed actions have no causal mechanism to further isolate are compromise connectivity between or within local bull trout populations. Any effect in regard to isolation is entirely **neutral**.

Bull Trout Persistence and Genetic Integrity

Although local bull trout populations within the action area are at an elevated risk for loss of genetic variation and compromised persistence, there is no causal mechanism with the implementation of the proposed action to affect these indicators. There are no habitat or watershed level indictors being affected to such an extent that abundance (i.e. effective population sizes) could be reduced. In the absence of population contraction, the effects to genetic integrity and persistence are **neutral**.

Effects Analysis on the Primary Constituent Elements of Designated Critical Habitat

A thorough analysis for project effects to ESA-listed bull trout and anadromous salmonids yields an adequate and effective analysis of project effects to the features and functions of the primary constituent elements (PCEs) for designated critical habitat. Based on the crosswalk analysis between pertinent habitat indicators and PCEs of designated critical habitat, effects to PCEs of critical habitat from the programmatic categories are fully consistent with those effects identified for ESA listed fish species. Table 8 describes the crosswalk for listed anadromous species and Table 9 describes the process for bull trout.

There is no critical habitat designated for bull trout in NWFP areas, as such, there is no critical habitat designated within the action area of the proposed action.

Table 8. Crosswalk between Critical Habitat PCEs and the Habitat Indicators for Anadromous Salmonid Species.

Primary Constituent Elements	Habitat Indicators that Crosswalk with PCEs (Pathway: Indicator)
Spawning Habitat, as defined by water quality, water quantity, substrate	**Water Quality**: Temperature, Suspended Sediment, Substrate **Flow/Hydrology**: Change in Peak/Base flows **Habitat Elements**: Substrate/Embeddedness
Rearing as defined by adequate water quantity and floodplain connectivity	**Channel Conditions and Dynamics**: Floodplain connectivity **Flow/Hydrology**: Change in Peak/Base flow
Rearing as defined by adequate water quality and forage	**Water Quality**: Temperature, Substrate **Habitat Elements**: Large Woody Debris, Pool Frequency and Quality, Off-channel Habitat
Rearing as defined by adequate natural cover	**Habitat Elements**: Large Woody Debris, Pool Frequency and Quality, Large Pools, Off-channel Habitat
Migration as defined by habitat free of artificial obstructions, and adequate water quality, water quantity, and natural cover	**Habitat Access**: Physical Barriers **Water Quality**: Temperature **Flow/Hydrology**: Change in Peak/Base flow **Habitat Elements**: Large Woody Debris, Pool Frequency and Quality, Large Pools

Table 9. Crosswalk between Critical Habitat PCEs and the Habitat Indicators for Bull Trout.

Primary Constituent Elements	**Habitat Indicators that Crosswalk with PCEs (Pathway: Indicator)**
Permanent water having low levels of contaminants such that normal reproduction, growth and survival are not inhibited	**Pathway:** Water Quality **Indicator:** chemical contamination/nutrients
Water temperatures ranging from 2 to 15C (36 to 59F), with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life history stage and form, geography, elevation, diurnal and seasonal variation, shade, such as that provided by riparian habitat, and local groundwater influence	**Pathway:** Water Quality **Indicator:** temperature
Complex stream channels with features such as woody debris, side channels, pools, and undercut banks to provide a variety of depths, velocities, and instream structures	**Pathway:** Habitat Elements **Indicators:** large wood, pool frequency and quality, large pools, off channel habitat, refugia **Pathway:** Channel conditions and Dynamics **Indicators:** wetted width/maximum depth ratio, stream bank condition, floodplain connectivity
Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine substrate less than 0.63 cm (0.25 in) in diameter and minimal substrate embeddedness are characteristic of these conditions	**Pathway:** Water Quality **Indicator:** sediment **Pathway:** Habitat Elements **Indicator:** substrate embeddedness
A natural hydrograph, including peak, high, low, and base flows within historic ranges or, if regulated, a hydrograph that demonstrates the ability to support bull trout populations	**Pathway: Flow/Hydrology** **Indicator:** change in peak/base flows
Springs, seeps, groundwater sources, and subsurface water connectivity to contribute to water quality and quantity	**Pathway:** Channel Condition and Dynamics **Indicator:** floodplain connectivity **Pathway:** Flow/Hydrology **Indicator:** Change in peak/base flows
Migratory corridors with minimal physical, biological, or chemical barriers between spawning, rearing, over wintering, and foraging habitats, including intermittent or seasonal barriers induced by high water temperatures or low flows	**Pathway:** Habitat Access **Indicator:** Physical barriers **Pathway:** Water Quality **Indicator:** Chemical contaminants/nutrients, temperature **Pathway:** Flow/Hydrology **Indicator:** change in peak/base flows
An abundant food base including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish	**Pathways:** Water Quality, Habitat Elements, Channel Condition and Dynamics, Habitat Access **Indicators:** All 13 associated with these 4 pathways

Chapter VI – ESA Effects Determination

The Level 1 Team assigned conservative effect determinations since actions were assessed without knowing site-specific conditions. However, for approximately ten years the BLM and FS have been conducting these ongoing and routine activities under consultation from the regulatory agencies. Results from annual monitoring and reporting have provided a body of evidence on how successful the BLM and FS are at meeting Project Design Criteria and implementing projects under the Programmatic.

Based on monitoring activities over the past ten years, most activities are considered to have only minor adverse effects on steelhead and bull trout, and chinook, coho and chum salmon and their habitat. These effects generally come from the potential for minor amounts of sediment to reach streams, site specific reductions of large wood recruitment, disturbance to riparian vegetation, and/or disturbance to eggs, juvenile or adult fish. Some individual actions covered in a programmatic category may have negligible, beneficial, or no effect on bull trout; Lower Columbia, Mid-Columbia, and Upper Willamette steelhead; Oregon Coast and Lower Columbia coho salmon; and Upper Willamette and Columbia River chinook salmon. If an activity exceeds the typical range of effects described, then a separate consultation is required.

<u>**Effects Determinations for Salmon and Steelhead**</u>

Based on the analysis presented in the preceding chapters of the BA, the FS and BLM have determined the following proposed programmatic actions, *when implemented within a distance of 150' of waters with LFH*, **may affect, likely to adversely affect** Lower Columbia, Mid Columbia, and Upper Willamette steelhead; Lower Columbia coho salmon; Columbia River chum; Upper Willamette and Columbia River chinook salmon; and Oregon Coast coho salmon:

- ✓ road maintenance and storm proofing,
- ✓ repair of storm damaged roads,
- ✓ recreation site, trail and administrative structure maintenance,
- ✓ fisheries program surveys,
- ✓ environmental education programs,
- ✓ pump chance/helipond maintenance,
- ✓ road prism salvage and hazard tree removal
- ✓ commercial rafting permits, and
- ✓ renewal of telephone line and powerline line special use permits.

Based on analysis presented in the preceding chapters of the BA, the FS and BLM have determined the following proposed programmatic actions, *when implemented at distances greater than 150' from LFH*, **may affect, not likely to adversely affect** Lower Columbia, Mid-Columbia, and Upper Willamette steelhead; Lower Columbia coho salmon; Columbia River chum; Upper Willamette and Columbia River chinook salmon; and Oregon Coast coho salmon:

- ✓ road maintenance and storm proofing, and
- ✓ repair of storm damaged.

Based on analysis presented in the preceding chapters of the BA, the FS and BLM have determined the following proposed programmatic actions **may affect, not likely to adversely affect** Lower Columbia, Mid-Columbia, and Upper Willamette steelhead; Lower Columbia

coho salmon; Columbia River chum; Upper Willamette and Columbia River chinook salmon; and Oregon Coast coho salmon:

- ✓ miscellaneous special use permits and leases, and
- ✓ special forest products.

<u>Effects Determinations for Bull Trout</u>

Based on the analysis presented in the preceding chapters of the BA, the FS and BLM have determined the following proposed programmatic actions, *when implemented within a distance of 150' of waters with LFH*, **may affect, likely to adversely affect** bull trout;

- ✓ road maintenance and storm proofing,
- ✓ repair of storm damaged roads,
- ✓ recreation site, trail and administrative structure maintenance,
- ✓ fisheries program surveys,
- ✓ environmental education programs,
- ✓ pump chance/helipond maintenance,
- ✓ road prism salvage and hazard tree removal
- ✓ commercial rafting permits, and
- ✓ renewal of telephone line and powerline line special use permits.

Based on analysis presented in the preceding chapters of the BA, the FS and BLM have determined the following proposed programmatic actions, *when implemented at distances greater than 150' from LFH*, **may affect, not likely to adversely affect** bull trout:

- ✓ road maintenance and storm proofing, and
- ✓ repair of storm damaged.

Based on analysis presented in the preceding chapters of the BA, the FS and BLM have determined the following proposed programmatic actions **may affect, not likely to adversely affect** bull trout:

- ✓ miscellaneous special use permits and leases, and
- ✓ special forest products.

Chapter VII. Cumulative Effects

Scope

In the context of the ESA, cumulative effects encompass the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the covered area; in this case, Northwestern Oregon. Future Federal actions, including those unrelated to the proposed action, are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA.

Population Trends

The U.S. Census Bureau estimates that 3,700,758 persons lived in Oregon in 2006 (U.S. Census Bureau, 2007). Oregon's growth rate between censuses was ranked 11th-highest in the nation. However, with the exception of California, Oregon's growth rate was still slower than its neighboring states. Along with Oregon's slowing economy, the population growth rate has slowed in recent years. Oregon's growth rate dropped to 14th in the nation and now lags behind all of its neighboring states. Oregon's estimated population for July 1, 2005 was 3.631 million, an increase of 6.4 percent from the benchmark 2000 Census. Its population is expected to reach 4.061 million in 2013, with an annual rate of growth hovering around 1.4 percent (State of Oregon 2007).

Residential, Commercial, and Infrastructure Development

Intuitively, population growth results in increasing residential and commercial development. Improvements and upgrades to infrastructure (including highways, other transportation facilities, pipelines, power lines, and power plants) will likely track closely with increased residential and commercial development. Primary pathways of potential effects of land development include the following: direct habitat loss, decreased water quality, contamination of waterways and uplands, changes to runoff patterns, habitat fragmentation, isolation of populations, and loss of habitat diversity. In general, as development increases, the quantity and quality of habitat suitable for threatened and endangered species typically decreases. Based on past trends and types of development, future residential, commercial, and infrastructure development will likely lead to further habitat degradation. Actions taken to mitigate for the potential impacts of development may help slow the rate of habitat degradation.

Agriculture

Assuming future trends mirror the historical pattern in Oregon, substantial additional impacts to fish and wildlife due to agriculture are not likely. However, in many areas within the programmatic area, certain ongoing agricultural practices (such as irrigation, chemical application, and regular habitat disturbance in agricultural areas) are likely to prevent habitat from reaching properly functioning conditions for listed species.

Forestry

In Oregon, non-Federal timber harvest typically involves clear-cutting. Impacts from clear-cutting and forest roads have been well documented and such impacts are long lasting and additive. Timber harvest and associated impacts are concentrated in western Oregon. Although the rate of harvest appears to be slowing in some areas and improved forestry practices have been implemented, the collective impacts of past and reasonably foreseeable future forestry activities are likely to result in additional future degradation of habitat for listed species.

Pollutant Discharge
Air and water pollution can degrade habitat and have lethal and sub-lethal effects on fish and wildlife. Increased human population typically causes increased air and water pollution. Developed areas also generate effluent, and runoff is often polluted with a variety of substances. In Oregon, each of the subbasins within the programmatic area contain streams on the Oregon Department of Environmental Quality's (DEQ) 303(d) list for Water Quality Limited. Water temperature was the most frequent parameter exceeding state standards. Other notable parameters include bacteria, dissolved oxygen, flow modification, habitat modification, nutrients, pH, sedimentation, total dissolved gas, toxics, and turbidity.

Ongoing activities in Oregon will help mitigate or reverse pollutant sinks and sources. The DEQ, for instance, has assessed total maximum daily loads (TMDL) for several major basins since 1998. Even with measures to address TMDL, continued pollutant discharges will likely continue in the future and are very likely to degrade habitat for listed species.

Fish Recovery Efforts in Oregon
Beginning in 1997**,** the State of Oregon developed a comprehensive aquatic conservation strategy (The Oregon Plan). The goal of The Oregon Plan is to "restore populations and fisheries to productive and sustainable levels that will provide substantial environmental, cultural, and economic benefits" Components of this plan include (1) coordination of efforts by local, state, and federal governments as well as tribal, private, and other interests; (2) development of action plans with relevance and ownership at the local level; (3) monitoring progress; and (4) making appropriate corrective changes in the future. This process included chartering 84 locally formed "watershed councils" across the State. Membership on the watershed councils includes landowners; business interests; agricultural interests; sport fishers; irrigation/water districts; individuals; State, Federal, and Tribal agencies; and local government officials.

Conclusion for Cumulative Effects

The ESA listings of fish in Oregon have been based, in part, on the additive impacts of growth, development, and other human activities. At this point, the trends discussed above indicate that future impacts will progress similarly, leading to additional adverse impacts on all fish and wildlife and their habitats. Changes to past development practices and fish recovery efforts in Oregon in general and the Northwest Oregon Province in particular provide hope that past trends are not predictive of future circumstances.

References

Allendorf, F. W., and N. Ryman. 2002. The role of genetics in population viability analysis. Pages 50-85 in S.R. Beissinger and D.R. McCullough (eds). Population Viability Analysis. The University of Chicago Press, Chicago, IL.

Baker, J.P. and 7 authors. 2004. Alternative futures for the Willamette River basin, Oregon. Ecological Applications, 14(2): 313-324.

Baldwin, D.H., J.F. Sandahl, J.S. Labenia and N.L. Scholz. 2003. Sublethal effects of copper on coho salmon: Impacts on nonoverlapping receptor pathways in the peripheral olfactory nervous system. Environmental Toxicology and Chemistry 22:2266-2274.

Batt, P. E. 1996. State of Idaho bull trout conservation plan. Office of the Governor, Boise, Idaho.

Bilby, R.E., K. Sullivan, and S.H. Duncan. 1989. The generation and fate of road-surface sediment in forested watersheds in Southwestern Washington. Forest Science Vol. 35 (2): 453-468.

Broderson, J. Morris. 1973. Sizing Buffer Strips to Maintain Water Quality. M.S. Thesis, University of Washington, Seattle.

Brooks, K.M. 2000. Assessment of the environmental effects associated with wooden bridges treated with creosote, pentachlorophenol, or chromated copper arsenate wood. U.S. Department of Agriculture, Forest Service, Forest Products Laboratory, Madison, Wisconsin. (September 2000) http://www.fpl.fs.fed.us/documnts/FPLRP/fplrp587.pdf

Brooks, K.M. 2004. Environmental response to ACZA treated wood structures in a Pacific Northwest marine environment. A report prepared for J. H. Baxter and Company, San Mateo, California. 31 p. (January 20, 2004).

BRT (Biological Review Team) 2003b. Preliminary conclusions regarding the updated status of listed ESUs of West Coast salmon and steelhead. 142 pages. February. NOAA Fisheries, 525 NE Oregon Street, Suite 500, Portland, Oregon 97232-2737. (Available @ www.nwfsc.noaa.gov/)

BRT (West Coast Salmon Biological Review Team). 2003a. Updated status of Federally listed ESUs of West Coast salmon and steelhead. U. S. Department of Commerce, National Marine Fisheries Service, Northwest Fisheries Science Center and Southwest Fisheries Science Center (July 2003). http://www.nwr.noaa.gov/AlseaResponse/20040528/brtusr.html

Buchanan, D. V., M. L. Hanson, and R. M. Hooton. 1997. Status of Oregon's bull trout. Oregon Department of Fish and Wildlife, Portland, Oregon. 168.

Burkey, T. V. 1989. Extinction in nature reserves: the effect of fragmentation and the importance of migration between reserve fragments. Oikos 55 75-81.

Burkey, T. V. 1995. Extinction rates in archipelagoes: Implications for populations in fragmented habitats. Conservation Biology 9: 527-541.

Burroughs, E.R., Jr., J.G. King. 1989. Reduction of soil erosion on forest roads. Gen. Tech. Rep. INT-264. Odgen, Ut. USDA, Forest Service, 21 p.

Busby, P. J., T. C. Wainwright, G. J. Bryant, L. Lierheimer, R. S. Waples, F. W. Waknitz, and I. V. Lagomarsino. 1996. Status review of West Coast steelhead from Washington, Idaho, Oregon, and California. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-27.

Castelle, A.J., C. Conolly, M. Emers, E.D. Metz, S. Meyer, M. Witter, S. Mauermann, T. Erickson, S.S. Cooke. 1992. Wetland Buffers: Use and Effectiveness. Adolfson Associates, Inc., Shorelands and Coastal Zone Management Program, Washington Department of Ecology, Olympia, Pub. No. 92-10.

Cole, D. N. and J. L. Marion. 1988. Recreation impacts in some riparian forests of the Eastern United States. Environmental Management 12: 99-107.

Cole, D. N. and P.B. Landres. 1995. Indirect effects of recreation on wildlife. IN Knight, R.L., K.J. Gutzwiller, eds. Wildlife and Recreationists—Coexistence Through Management and Research. Island Press, Washington, D.C, pages 183-202

Collier, T.K., J.P. Meador and L.L. Johnson. 2002. Introduction: Fish tissue and sediment effects thresholds for polychlorinated biphenyls, polycyclic aromatic hydrocarbons, and tributylin. Aquatic Conservation: Marine and Freshwater Ecosystems 12:489-492.

Corbett, E.S. and J.A. Lynch. 1985. Management of Streamside Zones on Municipal Watersheds. pp. 187-190. *In*: R.R. Johnson, C.D. Ziebell, D.R. Patton, P.F. Folliott, and R.H. Hamre (eds.), Riparian Ecosystems and their Management: Reconciling Conflicting Uses. First North American Riparian Conference, April 16-18, 1985, Tucson, Arizona.

Dahl, T.E. 1990. Wetland losses in the United States 1780s to `980s. USDI Fish and Wildlife Serv., Washington, D.C.

DeVenzio, H. Undated. Timber treatments: New preservatives and standards change the way people build and specify. Bridge Builder Magazine.

Duncan, S.H., R.E. Bilby, J.W. Ward and J.T. Heffer. 1987. Transport of road-surface sediment through ephemeral stream channels. Water Resources Research. Vol. 23 (1): 113-119.

Dunham, J.B., and B.E. Rieman. 1999. Metapopulation structure of bull trout: influences of physical, biotic, and geometrical landscape characteristics. Ecological Applications, 9:2, 642–655.

Eberl, J., and D. Kamikawa. 1992. Upper Clackamas River bull trout survey. Mt. Hood National Forest, Oregon.

Erman, D.C., J.D. Newbold, and K.B. Roby. 1977. Evaluation of Streamside Bufferstrips for Protecting Aquatic Organisms. Technical Completion Report, Contribution #165. California Water Resources Center, Univ. of California, Davis.

Everest, F.H.; Bestcha, R.L.; Scrivener, J.C.; Koski, K.V.; Sedell, J.R.; Cederholm, C.J. 1987. Fine sediment and salmonid production: a paradox. In. Salo, E.O.; Cundy, T.W., eds. Streamside management: forestry and fishery interactions. Contribution 57. Seattle, Washington: University of Washington, Institute of Forest Resources. 98-142.

FEMAT. 1993. Forest ecosystem management; an ecological, economic and social assessment. USDA and five other federal agencies.

FPL (Forest Products Laboratory). 2000. What's in that pressure-treated wood? U.S. Department of Agriculture, Forest Service, Forest Products Laboratory, Madison, Wisconsin. http://www.fpl.fs.fed.us/techlines.htm

FPL (Forest Products Laboratory). 2001a. Coatings minimize leaching from treated wood. U.S. Department of Agriculture, Forest Service, Forest Products Laboratory, Madison, Wisconsin. (November, 2001) http://www.fpl.fs.fed.us/techlines.htm

FPL (Forest Products Laboratory). 2001b. Environmental impact of preservative-treated wood. U.S. Department of Agriculture, Forest Service, Forest Products Laboratory, Madison, Wisconsin. (December, 2001) http://www.fpl.fs.fed.us/techlines.htm

FPL (Forest Products Laboratory). 2003. Changes in pressure-treated wood for residential construction. U.S. Department of Agriculture, Forest Service, Forest Products Laboratory, Madison, Wisconsin. http://www.fpl.fs.fed.us/techlines.htm

Fraley, J. J., and B. B. Shepard. 1989. Life history, ecology and population status of migratory bull trout (Salvelinus confluentus) in the Flathead Lake and river system, Montana. Northwest Science 63: 133-143.

Franklin, I. R. 1980. Evolutionary changes in small populations. In: M. E. Soule and B. A. Wilcox, editors. Conservation biology: An evolutionary-ecological perspective. Sinauer Associates, Sunderland, Massachusetts 135-149.

Franklin, I. R., and R. Frankham. 1998. How large must populations be to retain evolutionary potential? Animal Conservation 1: 69-70.

Furniss, M.J., T.D. Roelofs and C.S. Yee. 1991. Road construction and maintenance. In *Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats*; W.R. Meehan, ed. Pgs. 181-205. American Fisheries Society Special Publication 19. Bethesda, MD.

Goetz, F. 1989. Biology of the bull trout, Salvelinus confluentus, literature review. U.S. Department of Agriculture, U.S. Forest Service, Willamette National Forest, Eugene, Oregon.

Gomi, T., R.D. Moore, and M.A. Hassan. 2005. Suspended sediment dynamics in small forest streams of the Pacific Northwest. J. Am. Water Res. Association. August 2005. pp 877-898.

Good, R.P., R.S. Waples, and P. Adams (editors). 2005. Updated status of federally listed ESUs of West Coast salmon and steelhead. U.S. Dept. Commer., NOAA tech. Memo. NMFSNWFSC-66, 598 p. Available at: http://www.nwr.noaa.gov/Publications/Biological-Status-Reviews/upload/SR2005-allspecies.pdf

Hansen, J.A., J.C.A. Marr, J. Lipton, D. Cacela and H.L. Bergman. 1999a. Differences in neurobehavioral responses of Chinook salmon (*Oncorhynchus tshawytscha*) and rainbow trout (*Oncorhynchus mykiss*) exposed to copper and cobalt: Behavioral avoidance. Environmental Toxicology and Chemistry 18:1972-1978.

Hansen, J.A., J.D. Rose, R.A. Jenkins, K.G. Gerow and H.L. Bergman. 1999b. Chinook salmon (*Oncorhynchus tshawytscha*) and rainbow trout (*Oncorhynchus mykiss*) exposed to copper and cobalt: Neurophysiological and histological effects on the olfactory system. Environmental Toxicology and Chemistry 18:1979-1991.

Hara, T.J., Y.M.C. Law and S. MacDonald. 1975. Effects of mercury and copper on the olfactory response in rainbow trout. Journal of the Fisheries Research Board of Canada 33:1568-1573.

Hard, J. 1995. A quantitative genetic perspective on the conservation of intraspecific diversity. American fisheries Society Symposium 17: 304-326.

Hicks, B.J., Bestcha, R.L., Bisson, P.A.; Sedell, J.R. 1991. Response of salmonids to habitat change. Amer. Fish. Soc. Spec. Pub. 19: 483-518.

Hingston, J.A., C.D. Collins, R.J. Murphy, and J.N. Lester. 2001. Leaching of chromated copper aresenate wood preservatives: A review. Environmental Pollution 111:53-66.

Hoelscher, B., and T. C. Bjornn. 1989. Habitat, density and potential production of trout and char in Pend Oreille Lake tributaries. Project F-71-R-10, Subproject III, Job No. 8. Idaho Department of Fish and Game, Boise, Idaho.

Howell, P. J., and D. V. Buchanan. 1992. Proceedings of the Gearhart Mountain Bull Trout Workshop. Oregon Chapter of the American Fisheries Society, Corvallis, Oregon.

Interior Columbia Basin Technical Recovery Team (ICTRT). 2003. http://www.nwfsc.noaa.gov/trt/trt_columbia.cfm

Johnson, G. E., H. Diefenderfer, T. Berquam, B. D. Ebberts and J. D. Wilcox. 2003. Research, Monitoring, and Evaluation Plan for the Columbia River Estuary and Plume, Draft. The U.S.

Army Corps of Engineers Prepared by Bonneville Power Administration, Portland District, and the Pacific Northwest National Laboratory.

Johnson, L. 2000. An analysis in support of sediment quality thresholds for polycyclic aromatic hydrocarbons (PAHs) to protect estuarine fish. White Paper from National Marine Fisheries Service, Northwest Fisheries Science Center, Seattle, Washington. 29 p.

Johnson, L., S.Y. Sol, G.M. Ylitalo, T. Hom, B. French, O.P. Olson, and T.K. Collier. 1999. Reproductive injury in English sole (*Pleuronectes vetulus*) from the Hylebos Waterway, Commencement Bay, Washington. Journal of Aquatic Ecosystem Stress and Recovery. 6:289-310.

Johnson, L.L., T.K. Collier and J.E. Stein. 2002. An analysis in support of sediment quality thresholds for polycyclic aromatic hydrocarbons (PAHs) to protect estuarine fish. Aquatic Conservation: Marine and Freshwater Ecosystems 12:517-538.

Johnson, O.W, W.S. Grant, R.G. Cope, K. Neely, F.W. Waknitz and R.S. Waples. 1997. Status review of chum salmon from Washington, Oregon, and California. U.S. Dept. Commerce, NOAA Tech. Memo. NMFS-NWFSC-32, 280 p.

Jones, J.A. and G.E. Grant. 1996. Peak flow responses to clearcutting and roads in small and large basins, western Cascades, Oregon. Water Resources Research 32:4: 959-974.

Julliard, A.K., D. Saucier and L. Astic. 1996. Time-course of apoptosis in the olfactory epithelium of rainbow trout exposed to a low copper level. Tissue Cell 28:367-377.

Leathe, S. A., and P. Graham. 1982. Flathead Lake fish food habits study. Environmental Protection Agency, through Steering Committee for the Flathead River Basin Environmental Impact Study. Contract R008224-01-4 to Montana Department of Fish, Wildlife and Parks.

Lebow, S. 1996. Leaching of wood preservative components and their mobility in the environment—Summary of pertinent literature. . U.S. Department of Agriculture, Forest Service, Forest Products Laboratory, Madison, Wisconsin. 36 p. http://www.fpl.fs.fed.us/documnts/fplgtr/fplgtr93.pdf

Lebow, S. 2004a. Alternatives to chromated copper arsenate (CCA) for residential construction. Pages 156-168 in Pre-Conference Proceedings, Environmental Impacts of Preservative-Treated Wood. Florida Center for Solid and Hazardous Waste Management, Gainesville, Florida. http://www.ccaresearch.org/Pre-Conference/#release

Lebow, S. 2004b. Variability in evaluating environmental impacts of treated wood. Pages 3-16 in Pre-Conference Proceedings, Environmental Impacts of Preservative-Treated Wood. Florida Center for Solid and Hazardous Waste Management, Gainesville, Florida. http://www.ccaresearch.org/Pre-Conference/#release

Lebow, S., P. Cooper and P. Lebow. 2004. Variability in evaluating environmental effects of treated wood. Pages in Pre-Conference Proceedings, Environmental Impacts of Preservative-Treated Wood. Florida Center for Solid and Hazardous Waste Management, Gainesville, Florida. http://www.ccaresearch.org/Pre-Conference/#release

Lebow, S.T., and M. Tippie. 2001. Guide for minimizing the effect of preservative-treated wood on sensitive environments. Department of Agriculture, Forest Service, Forest Products Laboratory, Madison, Wisconsin. 18 p. http://www.fpl.fs.fed.us/documnts/fplgtr/fplgtr122.pdf

Lee, D.C., J.R. Sedell, B.E. Rieman, R.F. Thurow, J.E. Williams and others. 1997. Chapter 4: Broadscale Assessment of Aquatic Species and Habitats. In T.M. Quigley and S. J. Arbelbide eds "An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins Volume III." U.S. Department of Agriculture, Forest Service, and U.S. Department of Interior, Bureau of Land Management, Gen Tech Rep PNW-GTR-405).

Legreta, M., L. Odieb, D. Demarea, and A. Julliena. 2005. Leaching of heavy metals and polycyclic aromatic hydrocarbons from reclaimed asphalt pavement. Water Research 39: 3675–3685.

Luce, C.H. and T.A. Black. 1999. Sediment production from forest roads in western Oregon. Water Resources Research, Vol. 35(8): 2561-2570.

Luce, C.H. and T.A. Black. 2001. Effects of traffic and ditch maintenance on forest road sediment production. Federal Interagency Sedimentation Conference, March 25-29, 2001.

Lynch, J.A., E.S. Corbett, and K. Mussallem. 1985. Best Management Practices for Controlling Nonpoint-Source Pollution on Forested Watersheds. J. Soil and Water Conservation 40:164-167.

Lynch, M., and R. Lande. 1998. The critical effective size for a genetically secure population. Animal Conservation 1: 70-72.

Madej, M, W. E. Weaver and D.K. Hagans. 1994. Analysis of bank erosion on the Merced River, Yosemite Valley, Yosemite National Park, California, USA. Environmental Management 18: 235-250.

McElhany, P., M. Ruckleshaus, M. J. Ford, T. Wainwright, and E. Bjorkstedt. 2000. Viable Salmon Populations and the Recovery of Evolutionarily Significant Units. U. S. Department of Commerce, National Marine Fisheries Service, Northwest Fisheries Science Center, NOAA Technical Memorandum NMFS-NWFSC-42. 156 p. http://www.nwfsc.noaa.gov/publications/techmemos/tm42/tm42.pdf

Meffe, G. K., and C. R. Carroll. 1994. Principles of conservation biology. Sinauer Associate, Inc. Sunderland, Massachusetts.

Moran, D.T., J.C. Rowley, G.R. Aiken and B.W. Jafek. 1992. Ultrastructural neurobiology of the olfactory mucosa of the brown trout, *Salmo trutta*. Microscopy Research and Technique 23:28-48.

Moring, J.R. 1982. Decrease in Stream Gravel Permeability After Clearcut Logging: An Indication of Intragravel Conditions for Developing Salmonid Eggs and Alevins. Hydrobiologia 88:295-298.

Myers, J. M., C. Busack, D. Rawding, and A. Marshall. 2002. Identifying historical populations of Chinook and chum salmon and steelhead within the Lower Columbia River and Upper Willamette River evolutionarily significant units. May 10 draft report to the comanagers from the Willamette/Lower Columbia River Technical Recovery Team, Northwest Fisheries Science Center, 2725 Montlake Blvd. E., Seattle, WA 98112.

Myers, J.M., R.G. Kope, G.J. Bryant, D. Teel, L.J. Lierheimer, T.C. Wainwright, W.S. Grant, F.W. Waknitz, K. Neely, S.T. Lindley, and R.S. Waples. 1998. Status review of Chinook salmon from Washington, Idaho, Oregon, and California. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-35, 443 p.

Newbold, J.D., D.C. Erman, K.B. Roby. 1980. Effects of Logging on Macroinvertebrates in Streams With and Without Buffer Strips. Can. J. Fish Aquat. Sci. 37:1076-1085.

NMFS (National Marine Fisheries Service). 1996. Status review update for coho salmon from Washington, Oregon, and California. Draft document prepared by the West Coast Coho Salmon Biological Review Team, 20 December 1996.

NMFS (National Marine Fisheries Service). 1998. Conclusions regarding the updated status of Puget Sound, Lower Columbia River, Upper Willamette River, and Upper Columbia River ESUs of spring-run west coast Chinook salmon. Memorandum dated 23 December 1998 to U. Varanasi and W. Stelle, Northwest Fisheries Science Center, and W. Hogarth, Southwest Fisheries Science Center, from M. Schiewe, Northwest Fisheries Science Center, 2725 Montlake Blvd. E., Seattle, WA 98112

NMFS (National Marine Fisheries Service). 1999. Updated review of the status of the Upper Willamette River and Middle Columbia River ESUs of steelhead. Memorandum for W. Stelle and W. Hogarth from M. Schiewe, 12 January 1999. (Available from National Marine Fisheries Service, 1201 Lloyd Boulevard, Suite 1100, Portland, OR 97232.)

NMFS (National Marine Fisheries Service). 2001. Status review update for lower Columbia River coho salmon. West Coast Coho Salmon Biological Review Team, May 2001. (Available from L. Weitkamp, Northwest Fisheries Science Center, 2725 Montlake Blvd. E., Seattle, WA 98112.)

NMFS (National Marine Fisheries Service). 2005. Final Assessment of NOAA Fisheries' Critical Habitat Analytical Review Teams for 12 Evolutionarily Significant Units of West Coast Salmon and Steelhead. NOAA Fisheries, Protected Resources Division. Portland, Oregon.

NMFS (National Marine Fisheries Service). 1996. Making Endangered Species Act determinations of effect for individual or grouped actions at the watershed scale. Environmental and Technical Services Division, Habitat Conservation Program.

NMFS (National Marine Fisheries Service). 1997. Status review update for coho salmon from the Oregon and Northern California coasts. West Coast Coho Salmon Biological Review Team, 28 March 1997.

NMFS (National Marine Fisheries Service). 1999. Status review update for chum salmon from Hood Canal summer-run and Columbia River ESUs. February. Available at: http://www.nwr.noaa.gov/Publications/Biological-Status-Reviews/upload/SR1999-chum.pdf.

NMFS (National Marine Fisheries Service). 2005b. 2005 Report to Congress Pacific Coastal Salmon Recovery Fund 2000-2004. NMFS, Northwest Region, Seattle, Washington. 51 p.

NOAA (National Ocean and Atmospheric Administration) 2003. Environmental and aesthetic impacts of small docks and piers – Workshop report: Developing a science-based decision support tool for small dock management, Phase 1: Status of the science. R. Kelty and S. Bliven (editors). NOAA Coastal Ocean Program Decision Analysis Series No.22. http://www.cop.noaa.gov/pubs/das.html

NOAA (National Oceanic and Atmospheric Administration). 1999. NOAA Screening Quick Reference Tables (SQuiRTs) for Inorganics in Solids (freshwater and marine sediment, plus soil) (revised October 1999) http://response.restoration.noaa.gov/cpr/sediment/squirt/squirt.html

ODFW. 2001. Oregon Department of Fish and Wildlife. Review of T & E, sensitive and stocks of concern. Unpublished report. South Willamette Watershed District, Springfield, Oregon.

ODFW. 2007. Progress Reports. Hood River Bull Trout Abundance, Life History, and Habitat Connectivity, 2007. Steven J. Starcevich and Steven E. Jacobs. Native Fish Investigations Project. Corvallis Research Lab, Corvallis, Oregon. November 2007

Poston, T. 2001. Treated wood issues associated with overwater structures in marine and freshwater environments. Prepared for the Washington Departments of Fish and Wildlife, Ecology, and Transportation. Olympia, Washington.

Pratt, K. L. 1985. Pend Oreille trout and char life history study. Idaho Department of Fish and Game in cooperation with the Pend Oreille Idaho Club.

Pratt, K. L. 1992. A review of bull trout life history, in P.J. Howell, and D.V. Buchanan, eds. Proceedings of the Gearhart Mountain Bull Trout Workshop. Oregon Chapter of the American Fisheries Society, Corvallis, Oregon. 5-9.

Pribyl, S., C. Ridgley, and J. A. Newton 1996. Bull trout population summary Hood River Subbasin. The Dalles, OR.

Ratliff, D. E., and P. J. Howell. 1992. The status of bull trout populations in Oregon. In: P.J. Howell and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis 10-17.

Reid, L.M. and T. Dunne. 1984. Sediment production from forest road surfaces. Water Resources Research. Vol. 20 (11): 1753-1761.

Rich, C. F., Jr. 1996. Influence of abiotic and biotic factors on occurrence of resident bull trout in fragmented habitats, western Montana. M.S. Thesis, Montana State University, Bozeman, Montana.

Rieman, B. E., and F. W. Allendorf. 2001. Effective Population Size and Genetic Conservation Criteria for Bull Trout. North American Journal of Fisheries Management 21: 756-764.

Rieman, B. E., and J. B. Dunham. 2000. Metapopulations and salmonids: a synthesis of life history patterns and empirical observations. Ecology of Freshwater Fish 9: 1-2.

Rieman, B. E., and J. D. McIntyre. 1993. Demographic and habitat requirements for conservation of bull trout. General Technical Report INT_302. U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, Utah.

Rieman, B. E., and J. D. McIntyre. 1995. Occurrence of bull trout in naturally fragmented habitat patches of varied size. Transactions of the American Fisheries Society 124: (3) 285-296.

Rieman, B. E., and J. D. McIntyre. 1996. Spatial and temporal variability in bull trout redd counts. North American Journal of Fisheries Management 16: 132-141.

Rieman, B. E., D. C. Lee, and R. F. Thurow. 1997. Distribution, status, and likely future trends of bull trout within the Columbia River and Klamath River basins. North American Journal of Fisheries Management 17: 1111-1125.

Ritter, M.A., J.A. Kainz, and G.J. Porter. 1996a. Field performance of timber bridges: 5. Little Salmon Creek stress-laminated deck bridge. U. S. Department of Agriculture, Forest Service, Forest Products Laboratory, Madison, Wisconsin. Research Paper FPL-RP-547. 15 p. http://216.48.37.142/pubs/viewpub.jsp?index=5876

Ritter, M.A., P.D.H. Lee, and G.J. Porter. 1996b. Field performance of timber bridges: 6. Hoffman Run stress-laminated deck bridge. U. S. Department of Agriculture, Forest Service, Forest Products Laboratory, Madison, Wisconsin. Research Paper FPL-RP-549. 16 p. http://216.48.37.142/pubs/viewpub.jsp?index=5877

Ryman, N., P. E. Jorde, and L. Laikre. 1995. Supportive breeding and variance effective population size. Conservation Biology 13: 673-676.

Saunders, D. A., R. J. Hobbs, and C. R. Margules. 1991. Biological consequences of ecosystem fragmentation: A review. Conservation Biology 5: 18-32.

Seaman, M. H. 1977. Columbia River Estuary: Inventory of Physical, Biological and Cultural Characteristics. Columbia River Estuary Studies Taskforce. Astoria, OR: 302.

Sedell, J. R., and F. H. Everest. 1991. Historic changes in pool habitat for Columbia River Basin salmon under study for TES listing. Draft U.S. Department of Agriculture Report, Pacific Northwest Research Station, Corvallis, Oregon.

Sedell, J.R. and J. L. Froggatt. 1984. Importance of streamside forests to large rivers: The isolation of the Willamette River, Oregon, USA from its floodplain by snagging and streamside forest removal. *International Vereinigung für Theoretische und Angewandte Limnologie Verhandlungen* 22:1828-1834.

Spence, B.C., G.A. Lomnicky, R.M. Hughes, and R.P. Novitzki. 1996. An ecosystem approach to salmonid conservation. TR-4501-96-6057. ManTech Environmental Research Services Corp., Corvallis, OR. (Available from the National Marine Fisheries Service, Portland, Oregon.)

Spruell, P., A. A. Hemmingsen, P. J. Howell, N. Kanda, and F. W. Allendorf. 2003. Conservation genetics of bull trout: Geographic distribution of variation at microsatellite loci. Conservation Genetics 4 17-29.

Spruell, P., B. E. Rieman, K. L. Knudsen, F. M. Utter, and F. W. Allendorf. 1999. Genetic population structure within streams: microsatellite analysis of bull trout populations. Ecology of Freshwater Fish 8: 114-121.

State of Oregon. 2007. 2007-2009 Governor's recommended budget, the economic and revenue environment.
http://www.oregon.gov/DAS/BAM/docs/Publications/GRB0709/01_Economic_Outlook.pdf

Stehr, C.M., D.W. Brown, T. Hom, B.F. Anulacion, W.L. Reichert, and T.K. Collier. 2000. Exposure of juvenile Chinook and chum salmon to chemical contaminants in the Hylebos Waterway of Commencement Bay, Tacoma, Washington. Journal of Aquatic Ecosystem Stress and Recovery 7:215-227.

Stilwell, D.E. and C.L, Musante. 2004. Effect of coatings on CCA leaching from treated wood in a soil environment. Pages 113 - 123 in Pre-Conference Proceedings, Environmental Impacts of Preservative-Treated Wood. Florida Center for Solid and Hazardous Waste Management, Gainesville, Florida. http://www.ccaresearch.org/Pre-Conference/#release

Thomas, D. W. 1983. Changes in the Columbia River Estuary Habitat Types over the Past Century. Columbia River estuary data development program. Columbia River estuary study taskforce (CREST). Astoria, Oregon: 51.

U.S. Census Bureau. 2007. http://quickfacts.census.gov/qfd/states/41000.html.

U.S. Department of Agriculture. Forest Service. 1996b. East Fork Hood River and Middle Fork Hood River Watershed Analysis. Mt. Hood National Forest. Oregon.

USACOE (U.S. Army Corps of Engineers). 2001. Biological Assessment, Columbia River Channel Improvements Project.

USDA and USDI. 1994a. Final supplemental environmental impact statement on management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl (Northwest Forest Plan). February.

USDA and USDI. 1994b. Record of decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the northern spotted owl; Standards and guidelines for management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl. USDA-FS and USDI-BLM. April.

USDA, USDC, USDI and USDI . 2004. Analytical Process for Developing Biological Assessments for Federal Actions Affecting Fish within the Northwest Forest Plan Area (November, 2004)

USDA. 2005. Willamette National Forest Section 10 permit TE001822-4 Report. 12 pgs.

USDI and USDC. 1998. Endangered Species Consultation Handbook: Procedures for Conducting Section 7 Consultations and Conferences. USDI-FWS and USDC-NOAA-Fisheries, Washington, DC.

USFWS. 2002a. U.S. Fish and Wildlife Service. Chapter 5, Willamette River Recovery Unit, Oregon. In: Bull Trout (Salvelinus confluentus) Draft Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon. 97.

USFWS. 2002b. U.S. Fish and Wildlife Service. Chapter 6, Hood River Recovery Unit, Oregon. In: Bull Trout (Salvelinus confluentus) Draft Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon. 66.

Watson, G., and T. W. Hillman. 1997. Factors affecting the distribution and abundance of bull trout: An investigation at hierarchical scales. North American Journal of Fisheries Management 17: 237-252.

Weis, J. and P. Weis. 2004. Effects of CCA wood on non-target aquatic biota. Pages 32 - 44 in Pre-Conference Proceedings, Environmental Impacts of Preservative-Treated Wood. Florida Center for Solid and Hazardous Waste Management, Gainesville, Florida. http://www.ccaresearch.org/Pre-Conference/#release

Weis, J.S. and P. Weis. 2002. Contamination of saltmarsh sediments and biota by CCA treated wood walkways. Marine Pollution Bulletin 44:504-510.

Weis, J.S., P. Weis and T. Proctor. 1998. The extent of benthic impacts of CCA-treated wood structures in Atlantic Coast estuaries. Archives of Environmental Contamination and Toxicology 34:313-322.

Weitkamp, L. A., T. C. Wainwright, G. J. Bryant, G. B. Milner, D. J. Teel, R. G. Kope, and R. S. Waples. 1995. Status review of coho salmon from Washington, Oregon, and California. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-24.

Wemple, B.C., J.A. Jones, and G.E. Grant. 1996. Channel network extension by logging roads in two basins, western Cascades, Oregon. Water Resources Bulletin 32:1-13.

Wentz, D.A., Bonn, B.A., Carpenter, K.D., Hinkle, S.R., Janet, M.L., Rinella, F.A., Uhrich, M.A., Waite, I.R., Laenen, A. and Bencala, K.E. 1998, Water Quality in the Willamette Basin, Oregon, 1991-95: U.S. Geological Survey Circular 1161 (updated June 25, 1998) http://water.usgs.gov/pubs/circ1161

Winfield, T.P. 1986. Off the rack buying or tailor-made fits: what's best for Pacific Coast coastal wetlands. Pages 410-413 in J.A. Kusler, M.L. Quammen and G. Brooks, editors Proceedings of the national wetlands symposium: mitigation of impacts and losses. Association of State Wetland Managers. Berne, New York.

Wright, S. 1931. Evolution of Mendelian populations. Genetics 16: 97-159.

WWPI (Western Wood Preservers Institute). 1996. Best management practices for the use of treated wood in the aquatic environment (revised July 1996), at http://www.wwpinstitute.org/

Zimmerman, M.P. 1999. Clackamas River basin bull trout surveys, 1998–1999. Information Reports Number 99-5. Oregon Department of Fish and Wildlife, Clackamas.

Appendix A. Essential Fish Habitat Assessment

Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires Federal action agencies to consult with the Secretary of Commerce regarding any action or proposed action authorized, funded, or undertaken by the agency that may adversely affect essential fish habitat (EFH) identified under the MSA. The EFH regulations at CFR section 600.920(e)(l)(i) enable Federal agencies to use existing consultation and environmental review procedures to satisfy EFH consultation requirements if they meet the following criteria: 1) The existing process must provide the NMFS with timely notification (60-90 days) of actions that may adversely affect EFH; 2) notification must include an assessment of impacts of the proposed action as discussed in section 600.920(g): and 3) NMFS must have made a "finding" pursuant to section (e)(3) that the existing process satisfies the requirements of section 305 (b)(2) of the MSA (see below).

The NMFS has found that the existing NEPA and ESA environmental review process, including the Interagency Streamlined Consultation Procedure for Section 7 of the ESA (July 1999), used by the FS and the BLM for Federal Activities can be used to satisfy the EFH consultation requirements of the MSA provided that the NMFS, along with the FS and BLM, adhere to the procedural steps outlined in NMFS finding that the FS and BLM existing environmental review procedures for Federal actions meet EFH consultation requirements (September 13, 2000).

NEPA and ESA documents prepared by the FS and BLM should contain sufficient information to satisfy the requirements in 50 CFR 600.920(g) for EFH assessments and must clearly be identified as an EFH assessment. Mandatory contents of an EFH assessment are: 1) a description of the proposed action; 2) an analysis of individual and cumulative adverse effects of the action on EFH, the managed species, including affected life history states, and associated species such as major prey species; 3) a determination of effects on EFH; and 4) a discussion of proposed mitigation, if applicable.

Species Considered: Chinook and coho salmon; West Coast groundfish; coastal pelagic species.

Chinook and coho salmon. EFH for Chinook and coho salmon in the coastal basins overlaps with habitat occupied by the ESA-listed Oregon Coast (OC) coho salmon, including designated critical habitat. EFH overlaps occupied habitat for coho and Chinook in the lower Columbia River and its tributaries. EFH for these species in the upper Willamette basin overlaps habitat occupied by Chinook and steelhead trout.

Groundfish and Coastal Pelagics. The West Coast Groundfish and Coastal Pelagic Species plans list 13 categories of nonfishing activities that adversely affect these marine fish. None of the 13 categories implicitly includes any of the activities covered in this programmatic consultation. Any effects on these largely offshore marine fishes would probably be confined to those on juvenile stages rearing in brackish water in open bays (e.g., Pacific mackerel) along the Oregon coast.

Determinations:

The MSA defines adverse effects as any impacts that reduce the quality and/or quantity of EFH. Adverse effects include direct, indirect, and site-specific or habitat-wide impacts, including individual, cumulative or synergistic consequences of actions.

Chinook, coho and chum salmon. A discussion of direct, indirect, and cumulative effects upon EFH of salmon can be found in Chapter V. This analysis concluded that several activity categories would have short term effects on some habitat indicators, typically at the local scale. However, at the watershed scale effects would be insignificant.

EFH of salmon **may be adversely affected** by several activity categories *that may occur within a distance of 150' height of waters with Essential Fish Habitat*. These include:

- √ road maintenance and stormproofing;
- √ repair of storm damaged roads;
- √ recreation site, trail, and administrative structure maintenance and associated public use; and
- √ road prism salvage and hazard tree removal.

However, PDCs outlined within the BA will help to minimize these potential adverse effects.

Groundfish and Coastal Pelagics. Due to the distant proximity and low magnitude of activities, activities analyzed in this assessment will have **no adverse effect** on EFH for West Coast groundfish or coastal pelagic species.

The above document meets the requirements for an EFH assessment as outlined in NMFS finding that the FS and BLM existing environmental review procedures for Federal actions meet EFH consultation requirements (September 13, 2000).

Appendix B. Watershed Analyses
Willamette and Deschutes Provinces

Mt. Hood National Forest

Number	Watershed Analysis
1	Hood River Subbasin Plan. 2004. Hood River Soil and Water Conservation District (SWCD). Northwest Power Planning Council, Portland, Oregon.
2	Fish Creek Watershed Analysis. 1994. Mt. Hood National Forest. Oregon.
3	Mile Creeks Watershed Analysis. 1994. Mt. Hood National Forest. Oregon.
4	Collawash/Hot Springs Watershed Analysis. 1995. Revised 2003. Mt. Hood National Forest. Oregon.
5	Eagle Creek Watershed Analysis. 1995. Mt. Hood National Forest. Oregon.
6	Salmon River Watershed Analysis. 1995. Mt. Hood National Forest. Oregon.
7	Upper Clackamas River Watershed Analysis. 1995. Mt. Hood National Forest. Oregon.
8	Zigzag River Watershed Analysis. 1995. Mt. Hood National Forest. Oregon.
9	Clackamas River – Oak Grove Fork Watershed Analysis. 1996. Mt. Hood National Forest. Oregon.
10	East Fork Hood River and Middle Fork Hood River Watershed Analysis. 1996. Mt. Hood National Forest. Oregon.
12	Lower Clackamas River Watershed Analysis. 1996. Mt. Hood National Forest. Oregon.
13	North Fork Clackamas River Watershed Analysis. 1996. Mt. Hood National Forest. Oregon.
14	Roaring River Watershed Analysis. 1996. Mt. Hood National Forest. Oregon.
15	Upper Sandy Watershed Analysis. 1996. Mt. Hood National Forest. Oregon.
16	West Fork of Hood River Watershed Analysis. 1996. Mt. Hood National Forest. Oregon.
17	Bull Run River Watershed Analysis. 1997. Mt. Hood National Forest. Oregon.

18	South Fork of Clackamas River 1997. Mt. Hood National Forest. Oregon.
19	Columbia River Tributaries East Watershed Analysis. 1998. Mt. Hood National Forest. Oregon.
20	Oregon Columbia River Tributaries West Watershed Analysis. 1999. Columbia River Gorge National Scenic Area. Oregon.
21	Mill Creek Watershed Analysis. 2000. Columbia River Gorge National Scenic Area. Oregon.

Willamette National Forest

Number	Watershed Analysis
22	Blowout (part of N. Santiam Middle) Watershed Analysis. 1994, Willamette NF
23	South Fork McKenzie River Watershed Analysis. 1994, Willamette NF
24	Lower N. Fk. of Middle Fk. Willamette, Watershed Analysis. 1995, Willamette NF
25	Upper North Santiam Watershed Analysis. 1995, Willamette NF
26	Upper N. Fk. of Middle Fk. Willamette Watershed Analysis. 1995, Willamette NF
27	Upper Middle Fork of Willamette Watershed Analysis. 1995 (updated 2002) , Willamette NF
28	South Santiam Watershed Analysis. 1995, Willamette NF
29	Upper McKenzie River Watershed Analysis. 1995 (updated 2006)
30	Breitenbush Watershed Analysis. 1996, Willamette NF
31	Salmon Creek Watershed Analysis. 1996, Willamette NF
32	Winberry Creek Watershed Analysis. 1996, Willamette NF & Eugene BLM
33	Middle Santiam Watershed Analysis. 1996, Willamette NF
34	Blue River Watershed Analysis. 1996, Willamette NF
35	Middle Fork Willamette, Downstream Tribs Watershed Analysis. 1996, Willamette NF

36	Little Fall Creek Watershed Analysis. 1996, Willamette NF & Eugene BLM
37	Fall Creek Watershed Analysis. 1997, Willamette NF
38	Hills Creek Watershed Analysis. 1997, Willamette NF
39	Horse Creek Watershed Analysis. 1997, Willamette NF
40	Lower Middle Fork Willamette Watershed Analysis. 1997, Willamette NF
41	Middle North Santiam Watershed Analysis. 1997, Willamette NF
42	Salt Creek Watershed Analysis. 1998, Willamette NF
43	Detroit Reservoir Tributaries Watershed Analysis. 1998, Willamette NF
44	McKenzie Minor Tributaries Watershed Analysis. 1998, Willamette NF
45	Quartz Creek Watershed Analysis. 1998, Willamette NF

Salem BLM

Number	Watershed Analysis
46	North Yamhill Watershed Analysis. 1997. Salem BLM, Oregon.
47	Scappoose Creek Watershed Analysis. 1996. Salem BLM, Oregon.
48	Dairy-McKay Watershed Analysis. 1999. Salem BLM, Oregon.
49	Upper Tualatin-Scoggins Watershed Analysis. 2000. Salem BLM, Oregon.
50	Deer Creek, Panther Creek, Willamina Creek, and South Yamhill River Watershed Analysis. 1998. Salem BLM, Oregon.
51	Willamina Watershed Analysis. 1999. Yamhill Basin Council.
52	Rowell, Mill, Rickreall, Luckiamute River Watershed Analysis. 1998. Salem BLM, Oregon.
53	Luckiamute/Ash Creek/American Bottom/Watershed Assessment. 2004. Luckiamute Watershed Council.
54	Abiqua Butte Watershed Analysis. 1995. Salem BLM, Oregon.
55	Upper Clear Creek Watershed Analysis. 1995. Salem BLM, Oregon.

56	Clear Creek/Foster Creek Watershed Analysis. 2002. Clackamas River Basin Council.
57	Upper Collawash Watershed Analysis. 1995. Salem BLM, Oregon.
58	Crabtree Creek Watershed Analysis. 2001. Salem BLM, Oregon.
59	Gordon Creek Watershed Analysis. 2006. Salem BLM, Oregon.
60	Hamilton Creek Watershed Analysis. 1995. Salem BLM, Oregon.
61	Molalla River Watershed Analysis. 1999. Salem BLM, Oregon.
62	Pudding River Watershed Analysis. 2006. Pudding River Watershed Council.
63	Quartzville Creek Watershed Analysis. 2002. Salem BLM, Oregon.
64	Little North Santiam River Watershed Analysis. 1997. Salem BLM, Oregon.
65	North Santiam River Watershed Analysis. 2002. North Santiam Watershed Council.
66	Thomas Creek Watershed Analysis. 1996. Salem BLM, Oregon.

Eugene BLM

Number	Watershed Analysis
67	Calapooia River Watershed Analysis. 1999. Eugene BLM, Oregon.
68	Mohawk River/McGowan Creek Watershed Analysis. 1995. Eugene BLM, Oregon.
69	Mohawk River Supplemental Watershed Analysis. 2000. Eugene BLM, Oregon.
70	Vida/McKenzie River Watershed Analysis. 1996. Eugene BLM, Oregon.
71	Mosby Creek Watershed Analysis. 2000. Eugene BLM, Oregon.
72	Bear/Martin Creek Watershed Analysis. 1998. Eugene BLM, Oregon.
73	Little Fall Creek/Hill Creek Watershed Analysis. 2000. Eugene BLM, Oregon.
74	Lost Creek Watershed Analysis. 1997. Eugene BLM, Oregon.

75	Lookout Point Watershed Analysis. 1997. Eugene BLM, Oregon.
76	Camp Creek (supplemental to Vida/McKenzie) Watershed Analysis. 2001. Eugene BLM, Oregon.
77	Lower McKenzie Watershed Analysis. 1994. Eugene BLM, Oregon.

North Coast Province

Salem BLM

Number	Watershed Analysis
78	Mid Coast Sixth Field Watershed Assessment. 2001. Mid-Coast Watershed Councils.
79	Upper Siletz Watershed Analysis. 1996. Salem BLM and Mid-Coast Watershed Councils.
80	Rock Creek (Siletz) Watershed Analysis. 1996. Mid-Coast Watershed Councils
81	South Fork Alsea River Watershed Analysis. 1995. Salem BLM
82	North Fork Alsea River Watershed Analysis. 1996. Salem BLM
83	Lower Alsea River Watershed Analysis. 1999. Salem BLM
84	East Fork Nehalem River Watershed Analysis. 1996. Salem BLM
85	Kilchis River Watershed Analysis.
86	Trask River Watershed Analysis. 2003. E&S Environmental Chemistry, Corvallis
87	Wilson River Watershed Analysis. 2001. E&S Environmental Chemistry, Corvallis, Oregon

Siuslaw National Forest

Number	Watershed Analysis
88	Salmon-Neskowin Watershed Analysis. 1999. Siuslaw National Forest and Salem BLM
89	Lobster/Five Rivers Watershed Analysis. 1997. Siuslaw National Forest and Salem BLM
90	Yachats/Blodgett Watershed Analysis. 1997. Siuslaw National Forest
91	Drift Creek (Alsea) Watershed Analysis. 1997. Siuslaw National Forest
92	Drift-Lower Siletz Watershed Analysis. 1996. Siuslaw National Forest and Salem BLM
93	Big Elk Watershed Analysis. 1995. Siuslaw National Forest
94	Nestucca Watershed Analysis. 1994. Siuslaw National Forest and Salem BLM
95	Little Nestucca Watershed Analysis. 1998. Siuslaw National Forest
96	Mercer/Berry Watershed Analysis. 1996. Ecosystems Northwest, Corvallis
97	Cummins/Tenmile Watershed Analysis. 1995. Siuslaw National Forest
98	Beaver Creek Watershed Analysis. 2001. Siuslaw National Forest
99	Sand Lake Watershed Analysis. 1998. Siuslaw National Forest
100	Indian/Deadwood Watershed Analysis. 1996. Siuslaw National Forest
101	Lower Siuslaw Watershed Analysis. 1998. Siuslaw National Forest, Oregon
102	North Fork Siuslaw Watershed Analysis. 1994. Siuslaw National Forest, Oregon
103	Coastal Lakes Watershed Analysis. 1998. Siuslaw National Forest, Oregon

Eugene BLM -

Number	Watershed Analysis
104	Lake Creek Watershed Analysis. 1995. Eugene BLM, Oregon
105	Wolf Creek Watershed Analysis. 1995. Eugene BLM, Oregon
106	Wildcat Creek Watershed Analysis. 1999. Eugene BLM, Oregon
107	Siuslaw Watershed Analysis. 1995. Eugene BLM, Oregon

Appendix C. Annual Reporting Form for LAA activities (sample). There would be a separate reporting form for USFWS (bull trout) and NMFS (anadromous species).

Activity Levels

Subbasin	5ths	Owner	Road Maintenance and Storm Proofing	Repair Storm Damage Roads	Recreation Site, Trail, and Admin Structure Maintenance		Fish Programs	Environmental Ed	Pump Chance / Helipond Maintenance or Use	Roadside Hazard Trees	Commercial Rafting Permits	Telephone Line, Power Line Renewal Permits and ROW Renewals
			Road Miles	Miles	Trail Miles	Number of Campgrounds or Dispersed	Stream Miles	Number of Visits	Quantity	Acres	Quantity	Quantity
Willamette/Deschutes Province												
Middle Columbia/Hood	East Fork Hood River 1707010506	Mt. Hood										
		Other Fed										
		Non-FS or BLM										
		TOTAL										
Middle Fork Willamette	Upper Middle Fork Willamette River 1709000101	Willamette										
		Non-FS or BLM										
		TOTAL										
	Hills Creek 1709000102	Willamette										
		Non-FS or BLM										
		TOTAL										
	Salmon Creek 1709000104	Willamette										
		Non-FS or BLM										
		TOTAL										
	Hills Creek Reservoir 1709000105	Willamette										
		Other Fed										
		Non-FS or BLM										
		TOTAL										
McKenzie	Upper Mckenzie River 1709000401	Willamette										
		Non-FS or BLM										
		TOTAL										
	Horse Creek 1709000402	Willamette										
		Non-FS or BLM										
		TOTAL										
	South Fork Mckenzie River 1709000403	Willamette										
		Non-FS or BLM										
		TOTAL										
	Blue River 1709000404	Willamette										
		Non-FS or BLM										
		TOTAL										
	Mckenzie River/Quartz Creek 1709000405	Willamette										
		Non-FS or BLM										
		TOTAL										
	Lower Mckenzie River 1709000407	Willamette										
		Eugene										
		Non-FS or BLM										
		TOTAL										

Appendix D. Reported BLM/FS LAA programmatic activities, 2003-2006, in Willamette and Deschutes Provinces

	HUC 5	HUC 5 Name	Road Decommission	Aquatic Habitat				Road Maintenance	Recreation		Fish & Wildlife Surveys	Pump Chances	Rock Quarries	Special Use Permits	Telephone & Powerline ROW
			Miles	Stream Miles	Rip. Acres	Fish Culvert	100 yr culvert	Miles	Trail miles	Rec. Sites	Stream Miles	Number	Number	Number	Number
Mid Columbia/Hood	**1707010502**	Fifteenmile Creek	0	0	0	0	0	1	0.1	10	110	0	0	0	0
	1707010503	Fivemile Creek	0	0	0	0	0	9	0.1	12	66	1	0	0	0
	1707010504	Middle Columbia / Mill Creek	0	0	0	0	0	0	0	0	25	0	0	0	0
	1707010506	East Fork Hood River	0	0	0	0	0	24	0	0	32	7	0	0	0
	1707010507	West Fork Hood River	0	0	1	0	0	10	0	0	45	1	0	0	0
	1707010508	Hood River	0	0	0	0	0	1	0	0	0	0	0	0	0
	1707010512	Middle Columbia / Grays Creek	0	0	0	0	0	0	0	1	2	0	0	0	0
	1707010513	Middle Columbia/Eagle Creek	0	0	0	0	0	0	0	6	3.3	0	0	0	0
Lower Columbia/Sandy	**1708000101**	Salmon River	0	3	0	0	0	36	88	0	92	1	0	0	0
	1708000102	Zigzag River	0	0	0	0	0	43	33	0	16	0	0	0	0
	1708000103	Upper Sandy River	3	0	0	0	0	64	5	0	35	0	0	0	0
	1708000104	Middle Sandy River	29	0	0	0	0	14	0	0	0	0	0	0	0
	1708000105	Bull Run River	29	0	0	0	0	55	0	0	5	0	0	0	0
	1708000107	Columbia Gorge Tributaries	0	0	0	0	0	0	0	3	1	0	0	0	0
	1708000108	Lower Sandy River	0	0	0	0	0	2	0	0	2	0	0	0	0

Appendix D. Reported BLM/FS LAA programmatic activities, Willamette Province, 2003-2006 (continued).

	HUC 5	HUC 5 Name	Road Decommission	Aquatic Habitat				Road Maintenance	Recreation		Fish & Wildlife Surveys	Pump Chances	Rock Quarries	Special Use Permits	Telephone & Powerline ROW
			Miles	Stream Miles	Rip. Acres	Fish Culvert	100 yr culvert	Miles	Trail miles	Rec. Sites	Stream Miles	Number	Number	Number	Number
Middle Fk Willamette	**1709000101**	Upper Middle Fork Willamette River	0	0	0	3	0	2	0	0	0	0	0	0	0
	1709000102	Hills Creek	0	0	0	0	0	0	0	0	0	0	0	0	0
	1709000103	Salt Creek / Willamette River	0	0	0	0	0	0	0	0	0	0	0	0	0
	1709000104	Salmon Creek	0	0	0	0	0	0	0	0	0	0	0	0	0
	1709000105	Hills Creek Reservoir	0	0	0	0	0	4	0	0	0	0	0	0	0
	1709000106	North Fork Of Middle Fork Willamette	0	0	0	0	0	0	0	0	0	0	0	0	0
	1709000107	Middle Fork Willamette / Lookout Point	0	0	0	0	3	109	0	0	0	2	1	0	0
	1709000108	Little Fall Creek	0	0	0	0	0	10	0	0	0	1	0	0	0
	1709000109	Fall Creek	1	0	0	0	0	7	0	0	0	1	0	0	0
	1709000110	Lower Middle Fork Willamette River	1	0	0	0	0	14	0	0	0	0	0	0	0
Coast Fk	**1709000202**	Mosby Creek	0	0	0	0	0	43	0	0	0	2	0	0	0
Up Will.	**1709000301**	Long Tom River	0	0	0	0	0	15	0	0	0	0	2	0	1
	1709000303	Calapooia River	0	0	0	0	0	41	0	0	1.5	1	1	0	0
	1709000306	Luckiamute River	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix D. Reported BLM/FS LAA programmatic activities, 2003-2006, Willamette Province (continued).

	HUC 5	HUC 5 Name	Road Decommission	Aquatic Habitat				Road Maintenance	Recreation		Fish & Wildlife Surveys	Pump Chances	Rock Quarries	Special Use Permits	Telephone & Powerline ROW
			Miles	Stream Miles	Rip. Acres	Fish Culvert	100 yr culvert	Miles	Trail miles	Rec. Sites	Stream Miles	Number	Number	Number	Number
McKenzie	**1709000401**	Upper McKenzie River	0	3.2	0	0	0	3	0	29	5	0	0	155	0
	1709000402	Horse Creek	0	0	0	0	0	3	0	3	0	0	0	0	0
	1709000403	South Fork McKenzie River	0	9.5	0	0	0	2	0	30	2	1	0	1	0
	1709000404	Blue River	0	0	0	0	0	0	0	0	0	0	0	0	0
	1709000405	McKenzie River/Quartz Creek	0	1	0	1	0	0	0	0	0	0	0	0	0
	1709000406	Mohawk River	0	6	2	0	8	136	20	336	0	3	0	0	0
	1709000407	Lower McKenzie River	4	1	0	3	2	42	1	60	0	2	0	0	0
North Santiam	**1709000501**	Upper North Santiam River	0	0.3	0	0	0	2	0	0	4	0	0	0	0
	1709000502	Breitenbush River	0	0	0	0	0	0	0	0	6	0	0	0	0
	1709000503	Detroit Reservoir / Blow Out Divide Creek	0	0	0	0	0	0	0	0	0	0	0	0	0
	1709000504	Middle North Santiam River	0	0	0	0	0	4	0	2	0	0	0	0	0
	1709000505	Little North Santiam River	0	0	0	0	2	18	8	3	33	0	0	0	0

Appendix D. Reported BLM/FS LAA programmatic activities, 2003-2006, Willamette Province (continued).

	HUC 5	HUC 5 Name	Road Decommission	Aquatic Habitat				Road Maintenance	Recreation		Fish & Wildlife Surveys	Pump Chances	Rock Quarries	Special Use Permits	Telephone & Powerline ROW
			Miles	Stream Miles	Rip. Acres	Fish Culvert	100 yr culvert	Miles	Trail miles	Rec. Sites	Stream Miles	Number	Number	Number	Number
South Santiam	**1709000601**	Hamilton Creek / South Santiam River	0	0	0	0	0	4	0	0	0	0	0	0	0
	1709000602	Crabtree Creek	0	0	0	0	0	9	0	0	0	0	0	0	0
	1709000603	Thomas Creek	0	0	0	0	0	14	0	0	0	0	0	0	0
	1709000604	Quartzville Creek	0	0	0	0	0	0	0	0	0	0	0	0	0
	1709000605	Middle Santiam River	0	0	0	0	0	0	0	0	0	0	0	0	0
	1709000606	South Santiam River	0	0	0	0	0	11	0	8	2	0	0	0	0
	1709000608	Wiley Creek	0	0	0	0	0	0	0	0	0	0	0	0	0
Mid Will	**1709000702**	Rickreall Creek	0	0	0	0	0	0	0	0	0	0	0	0	0
Yamhill	**1709000801**	Upper South Yamhill River	0	0	0	0	0	0	0	0	0	0	0	0	0
	1709000802	Willamina Creek	0	0	0	0	0	9	0	1	5	0	0	0	0
	1709000803	Mill Creek/South Yamhill River	0	0	0	0	0	6	0	0	0	0	0	0	0
	1709000806	North Yamhill River	2	0	0	0	0	0	0	0	2	0	0	0	0

Appendix D. Reported BLM/FS LAA programmatic activities, 2003-2006, Willamette Province (continued).

	HUC 5	HUC 5 Name	Road Decommission	Aquatic Habitat				Road Maintenance	Recreation		Fish & Wildlife Surveys	Pump Chances	Rock Quarries	Special Use Permits	Telephone & Powerline ROW
			Miles	Stream Miles	Rip. Acres	Fish Culvert	100 yr culvert	Miles	Trail miles	Rec. Sites	Stream Miles	Number	Number	Number	Number
Molalla/ Pudding	**1709000902**	Butte Creek / Pudding River	0	0	0	0	0	2	0	0	0	0	0	0	0
	1709000905	Upper Molalla River	1	0	0	0	0	46	1	1	1	0	0	0	0
Tualatin	**1709001001**	Dairy Creek	0	1	0	0	1	0	0	0	3	0	0	0	0
	1709001003	Scoggins Creek	0	0	0	0	0	0	0	0	0	0	0	0	0
Lower Willamette	**1709001101**	Collawash River	0	0	0	0	0	31	0	30	6	6	0	0	0
	1709001102	Upper Clackamas River	0	4	2	2	0	43	0	60	12	9	0	0	0
	1709001103	Oak Grove Fork Clackamas River	0	8	0	1	1	21	0	60	0	0	0	0	0
	1709001104	Middle Clackamas River	4	7	0	1	1	24	8	120	20	3	0	45	0
	1709001105	Eagle Creek	0	0	0	0	0	3	0	6	3	0	0	0	0
	1709001106	Lower Clackamas River	0	0	0	0	0	0	0	0	0	0	0	0	0
Low Col.	**1709001202**	Scappoose Creek	0	0	0	2	0	0	0	0	2	0	0	0	0

Appendix E. Reported Forest Service LAA programmatic activities, 2003-2006, in watersheds with bull trout.

	HUC 5	HUC 5 Name	Road Decommission	Aquatic Habitat				Road Maintenance	Recreation		Fish & Wildlife Surveys	Pump Chances	Rock Quarries	Special Use Permits	Telephone & Powerline ROW
			Miles	Stream Miles	Rip. Acres	Fish Culvert	100 yr culvert	Miles	Trail miles	Rec. Sites	Stream Miles	Number	Number	Number	Number
Hood	**1707010506**	East Fork Hood River	0	4	0	0	0	10	0	0	65	0	0	0	0
	1707010507	West Fork Hood River	0	0	<1	0	0	8	0	0	1	0	0	0	0
Middle Fk Willamette	**1709000101**	Upper Middle Fork Willamette River	0	0	0	0	0	0	0	0	0	0	0	0	0
	1709000103	Salt Creek / Willamette River	0	0	0	0	0	0	0	0	0	0	0	0	0
	1709000104	Salmon Creek	0	0	0	0	0	0	0	0	0	0	0	0	0
	1709000105	Hills Creek Reservoir	0	0	0	0	0	0	0	0	0	0	0	0	0
	1709000106	North Fork Of Middle Fork Willamette	0	0	0	0	0	0	0	0	0	0	0	0	0
McKenzie	**1709000401**	Upper McKenzie River	0	2	0	0	0	2.1	0	19	0	0	0	42	0
	1709000402	Horse Creek	0	0	0	0	0	3.2	0	2	0	0	0	37	0
	1709000403	South Fork McKenzie River	0	8.5	0	0	0	1.7	0	30	2	1	0	1	0
	1709000405	McKenzie River/Quartz Creek	0	0	0	1	0	0	0	0	0	0	0	0	0

Appendix F. Reported BLM/FS LAA programmatic activities, 2003-2006, in North Coast Province (continued).

	HUC 5	HUC 5 Name	Road Maintenance	Road Decommission	Aquatic Habitat				Recreation		Fish & Wildlife Surveys	Pump Chances	Rock Quarries	Non Commercial Veg Treatments	Special Use Permits	Telephone & Powerline ROW
			Miles	Miles	Stream Miles	Rip. Acres	Fish Culvert	100 yr culvert	Trail miles	Rec. Sites	Stream Miles	Number	Number	Acres	Number	Number
Nehalem	1710020201	Upper Nehalem	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Wilson/Trask/Nestucca	1710020301	Little Nestucca	30	0	0	0	3	0	0		7	0	0	0	0	0
	1710020302	Nestucca	76	8	3	0	4	19	0	17	70	2	0	64	0	0
	1710020303	Tillamook	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1710020304	Trask	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1710020305	Wilson	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1710020306	Kilchis	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1710020310	Sand/Spring/Neskowin	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Siletz/Yaquina	1710020402	Big Elk	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1710020403	Lower Yaquina	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1710020404	Upper Siletz	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1710020407	Lower Siletz	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1710020408	Salmon/Siletz	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	1710020410	Devil's Lake/Moolack	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix F. Reported BLM/FS LAA programmatic activities, 2003-2006, in North Coast Province (continued).

	HUC 5	HUC 5 Name	Road Maintenance	Road Decommission	Aquatic Habitat				Recreation		Fish & Wildlife Surveys	Pump Chances	Rock Quarries	Non Commercial Veg Treatments	Special Use Permits	Telephone & Powerline ROW
			Miles	Miles	Stream Miles	Rip. Acres	Fish Culvert	100 yr culvert	Trail miles	Rec. Sites	Stream Miles	Number	Number	Acres	Number	Number
Alsea	1710020501	Upper Alsea	34	0	0	0	3	0	0	0	0	0	0	0	0	0
	1710020502	Five River Lobster	31	0	1	0	3	0	0	10	40	0	0	20	0	0
	1710020503	Drift Creek	2	0	0	0	0	0	2	0	20	0	0	0	0	0
	1710020504	Lower Alsea	60	0	1	0	2	0	0	122	8	0	0	0	0	0
	1710020505	Beaver Creek/Waldport	7	0	0	0	2	0	0	120	0	0	0	0	0	0
	1710020506	Yachats	11	0	0	0	0	0	0	6	33	0	0	0	0	0
	1710020507	Cummins/Tenmile/ Mercer Lake	38	0	0	0	0	0	7	400	42	0	0	55	1	2
Siuslaw	1710020601	Upper Siuslaw	42	1	1	1	6	0	0	4	45	0	0	0	0	0
	1710020602	Wolf	5	0	1	0	1	0	0	0	27	0	0	0	0	0
	1710020603	Wildcat	1	1	1	1	3	0	0	0	2	0	0	0	0	0
	1710020604	Lake Creek	62	0	0	0	5	0	0	0	26	0	0	0	0	0
	1710020605	Deadwood	17	5	0	0	0	0	0	0	13	0	1	0	0	0
	1710020606	Indian Creek/lake Creek	13	0	0	0	2	0	0	7	9	0	0	12	0	0
	1710020607	NF Siuslaw	12	0	14	0	2	0	0	17	27	0	0	0	0	0
	1710020608	Lower Siuslaw	9	0	3	0	0	0	2	4	30	0	0	0	0	0
Siltcoos	1710020701	Woahik/Siltcoos	10	0	0	0	0	0	0	0	22	0	0	21	0	0

Appendix G. Projected BLM/FS LAA programmatic activities. Willamette Province. Annual Average Estimate (FY 2008-2012) by 5th Field Watershed.

		Baseline Data					Activity Levels									
Subasin	5ths	Owner	Extent (Acres)	Total Roads (Miles)	Trails (Miles)	Estimated Miles of Roads within 150 ft of Streams with ESA listed fish (Willamette) and EFH (Coast)	Road Maintenance and Storm Proofing	Repair Storm Damage Roads	Recreation Site, Trail, and Admin Structure Maintenance		Fish Programs	Envirnonmental Ed	Pump Chance / Helipond Maintenance or Use	Roadside Hazard Trees	Commercial Rafting Permits	Telephone Line, Power Line Renewal Permits and ROW Renewals
							Road Miles	Miles	Trail Miles	Number of Campgrounds or Dispersed Sites	Stream Miles	Number of Visits	Quantity	Acres	Quantity	Quantity
Willamette Province																
Middle Columbia/Hood	Fifteenmile Creek 1707010502	Mt. Hood	14,750	62	16	1	1	1	1	5	50	15	1	3	0	1
		Other Fed	65	0	0											
		Non-FS or BLM	142,356	386	5											
		TOTAL	157,170	448	21											
	Fivemile Creek 1707010503	Mt. Hood	18,258	104	11	3	3	3	1	5	50	1	1	9	0	1
		Other Fed	543	0	0											
		Non-FS or BLM	59,356	185	0											
		TOTAL	78,157	289	11											
	Middle Columbia / Mill Creek 1707010504	Mt. Hood	13,578	53	4	0	0	0	0	1	15	1	1	0	0	1
		Scenic Area	761	2	0	0	0	0	0	0	0	0	1	0	0	0
		Other Fed	1,896	0	0											
		Non-FS or BLM	114,406	449	1											
		TOTAL	130,642	504	5											
	East Fork Hood River 1707010506	Mt. Hood	70,560	207	87	5	5	5	1	1	30	1	10	15	1	1
		Other Fed	200	0	0											
		Non-FS or BLM	30,047	223	2											
		TOTAL	100,807	430	89											
	West Fork Hood River 1707010507	Mt. Hood	44,053	151	25	3	3	3	1	0	30	3	1	9	0	1
		Non-FS or BLM	21,386	148	0											
		TOTAL	65,438	331	25											
	Hood River 1707010508	Mt. Hood	5,950	34	1	0	0	0	0	1	4	3	1	0	0	1
		Other Fed	162	0	0											
		Non-FS or BLM	45,155	288	0											
		TOTAL	51,267	322	1											
	Middle Columbia / Grays Creek 1707010512	Mt. Hood	2,242	1	10	0	0	0	0	0	1	0	0	0	0	0
		Scenic Area	11,013	6	11	1	1	1	0	1	6	5	1	3	0	0
		Non-FS or BLM	79,428	116	7											
		TOTAL	92,683	123	28											
	Middle Columbia/Eagle Creek 1707010513	Mt. Hood	32,744	8	53	0	0	0	0	0	0	0	0	0	0	0
		Scenic Area	7,888	7	15	1	1	1	1	6	6	10	1	3	0	0
		Non-FS or BLM	43,829	27	0											
		TOTAL	84,460	42	68											
Lower Columbia/Sandy	Salmon River 1708000101	Salem	1,284	4	0	1	1	0	0	1	2	50	1	1	0	0
		Mt. Hood	67,382	110	12	3	3	3	24	8	52	20	2	9	2	1
		Non-FS or BLM	5,019	38	3											
		TOTAL	73,684	152	15											
	Zigzag River 1708000102	Mt. Hood	36,535	57	10	7	7	7	17	12	35	1	2	21	1	3
		Non-FS or BLM	1,213	22	0											
		TOTAL	37,748	79	10											
	Upper Sandy River 1708000103	Mt. Hood	30,721	74	15	2	2	2	4	8	33	5	2	6	2	2
		Non-FS or BLM	3,464	15	0											
		TOTAL	34,185	89	15											
	Middle Sandy River 1708000104	Salem	3,841	37	0	1	1	0	0	0	0	0	0	3	0	0
		Mt. Hood	7,226	24	0	1	1	1	1	3	5	1	1	3	2	1
		Non-FS or BLM	29,872	202	0											
		TOTAL	40,939	263	0											
	Bull Run River 1708000105	Salem	372	6	0	0	0	0	0	0	0	0	0	0	0	0
		Mt. Hood	77,733	280	2	1	1	1	1	2	7	5	1	3	2	1
		Non-FS or BLM	10,842	54	0											
		TOTAL	88,947	340	2											
	Columbia Gorge Tributaries 1708000107	Scenic Area	21,754	31	35	1	1	1	1	7	5	15	1	3	0	1
		Mt. Hood	10,095	13	5	0	0	0	0	0	0	0	0	0	0	0
		Non-FS or BLM	72,033	117	0											
		TOTAL	103,882	161	40											
	Lower Sandy River 1708000108	Scenic Area	737	1	0	1	1	1	1	5	5	5	1	3	0	1
		Salem	3,656	12	0	0	0	0	0	0	0	0	0	0	0	0
		Mt. Hood	3,088	16	0	0	1	1	1	1	1	1	1	0	1	1
		Non-FS or BLM	39,655	330	0											
		TOTAL	47,135	359	0											

Appendix G. Projected BLM/FS LAA programmatic activities. Willamette Province. Annual Average Estimate (FY 2008-2012) by 5th Field Watershed (continued).

		Baseline Data					Activity Levels									
Subbasin	5ths	Owner	Extent (Acres)	Total Roads (Miles)	Trails (Miles)	Estimated Miles of Roads within 150 ft of Streams with ESA listed fish (Willamette) and EFH (Coast)	Road Maintenance and Storm Proofing	Repair Storm Damage Roads	Recreation Site, Trail, and Admin Structure Maintenance		Fish Programs	Environmental Ed	Pump Chance / Helipond Maintenance or Use	Roadside Hazard Trees	Commercial Rafting Permits	Telephone Line, Power Line Renewal Permits and ROW Renewals
							Road Miles	Miles	Trail Miles	Number of Campgrounds or Dispersed Sites	Stream Miles	Number of Visits	Quantity	Acres	Quantity	Quantity
Willamette Province																
Middle Fork Willamette	Upper Middle Fork Willamette River 1709000101	Willamette	101,980	470	32	3	3	1	12	2	27	10	0	9	0	0
		Non-FS or BLM	11,571	62	0											
		TOTAL	113,551	532	32											
	Hills Creek 1709000102	Willamette	36,304	204	5	3	3	1	1	1	5	4	0	9	0	0
		Non-FS or BLM	2,124	12	0											
		TOTAL	38,428	216	5											
	Salt Creek / Willamette River 1709000103	Willamette	72,255	193	58	2	2	1	0	1	10	4	0	6	0	0
		Non-FS or BLM	1,012	25	0											
		TOTAL	73,267	218	58											
	Salmon Creek 1709000104	Willamette	80,382	319	43	5	5	2	6	1	5	4	0	15	0	0
		Non-FS or BLM	2,014	22	1											
		TOTAL	82,396	341	44											
	Hills Creek Reservoir 1709000105	Willamette	87,741	484	16	23	23	6	11	6	20	10	0	69	0	0
		Other Fed	676	4	0											
		Non-FS or BLM	21,447	133	2											
		TOTAL	109,865	621	18											
	North Fork Of Middle Fork Willamette 1709000106	Willamette	148,669	558	115	12	12	3	12	1	12	5	0	36	0	0
		Non-FS or BLM	10,308	23	4											
		TOTAL	158,977	581	119											
	Middle Fork Willamette / Lookout Point 1709000107	Willamette	43,846	222	12	8	8	2	3	3	5	10	0	24	0	0
		Other Fed	95	0	0											
		Eugene	14,206	97	0	1	1	1	0	0	3	0	1	3	0	2
		Non-FS or BLM	43,727	302	3											
		TOTAL	101,873	621	15											
	Little Fall Creek 1709000108	Willamette	6,275	50	0	6	6	2	0	0	4	2	0	18	0	0
		Eugene	2,285	19	0	4	2	1	0	0	2	0	1	6	0	2
		Non-FS or BLM	28,889	236	0											
		TOTAL	37,449	305	0											
	Fall Creek 1709000109	Willamette	94,475	493	32	16	16	4	10	6	20	10	0	48	0	0
		Eugene	4,412	31	0	1	1	1	0	0	2	0	1	3	0	2
		Non-FS or BLM	24,599	138	1											
		TOTAL	123,485	662	33											
	Lower Middle Fork Willamette River 1709000110	Eugene	4,697	22	0	0	0	1	0	0	2	0	1	0	0	2
		Non-FS or BLM	31,299	248	3											
		TOTAL	35,996	270	3											
Coast Fork Willamette	Mosby Creek 1709000202	Eugene	16,736	105	0	1	1	1	0	1	2	0	1	3	0	2
		Non-FS or BLM	44,190	452	0											
		TOTAL	60,927	557	0											
Upper Willamette	Calapooia River 1709000303	Willamette	5,900	52	3	10	10	3	0	0	9	0	0	30	0	0
		Salem	37	0	0	0	0	0	0	0	0	0	0	0	0	0
		Eugene	8,672	53	0	1	1	1	0	0	1	0	1	3	0	1
		Non-FS or BLM	168,886	959	3											
		TOTAL	183,495	1,064	6											
	Luckiamute River 1709000306	Siuslaw	329	0	0	0	0	0	0	0	0	0	0	0	0	0
		Salem	8,818	38	2	1	1	0	0	0	6	0	0	3	0	1
		Non-FS or BLM	192,360	1,129	76											
		TOTAL	201,507	1,167	78											
McKenzie	Upper Mckenzie River 1709000401	Willamette	222,682	541	219	5	5	2	11	10	80	10	0	15	50	0
		Non-FS or BLM	7,845	124	3											
		TOTAL	230,527	665	222											
	Horse Creek 1709000402	Willamette	100,061	77	119	2	2	1	1	1	7	0	0	6	0	0
		Non-FS or BLM	1,705	9	0											
		TOTAL	101,767	86	119											
	South Fork Mckenzie River 1709000403	Willamette	128,930	263	154	17	17	5	7	9	13	0	0	51	12	0
		Non-FS or BLM	8,980	53	4											
		TOTAL	137,910	316	158											
	Blue River 1709000404	Willamette	52,437	237	16	2	2	1	0	0	3	0	0	6	0	0
		Non-FS or BLM	6,548	35	5											
		TOTAL	58,986	272	21											
	Mckenzie River/Quartz Creek 1709000405	Willamette	21,813	118	2	6	6	2	0	0	10	0	0	18	50	0
		Non-FS or BLM	25,894	151	0											
		TOTAL	47,707	269	2											
	Mohawk River 1709000406	Eugene	26,954	192	41	3	3	1	2	3	2	2	1	9	0	2
		Non-FS or BLM	87,558	533	-39											
		TOTAL	114,511	725	2											
	Lower Mckenzie River 1709000407	Willamette	7,126	14	0	0	0	0	0	0	0	0	0	0	0	0
		Eugene	25,377	117	0	1	1	1	0	3	2	1	2	2	0	2
		Non-FS or BLM	132,377	946	2											
		TOTAL	164,879	1,077	2											

Appendix G. Projected BLM/FS LAA programmatic activities. Willamette Province. Annual Average Estimate (FY 2008-2012) by 5th Field Watershed (continued).

		Baseline Data					Activity Levels									
Subasin	5ths	Owner	Extent (Acres)	Total Roads (Miles)	Trails (Miles)	Estimated Miles of Roads within 150 ft of Streams with ESA listed fish (Willamette) and EFH (Coast)	Road Maintenance and Storm Proofing	Repair Storm Damage Roads	Recreation Site, Trail, and Admin Structure Maintenance		Fish Programs	Environmental Ed	Pump Chance / Helipond Maintenance or Use	Roadside Hazard Trees	Commercial Rafting Permits	Telephone Line, Power Line Renewal Permits and ROW Renewals
							Road Miles	Miles	Trail Miles	Number of Campgrounds or Dispersed Sites	Stream Miles	Number of Visits	Quantity	Acres	Quantity	Quantity
Willamette Province																
North Santiam	Upper North Santiam River 1709000501	Willamette	133,580	282	123	3	3	1	1	9	19	3	0	9	0	0
		Non-FS or BLM	12,979	90	2											
		TOTAL	146,559	372	125											
	North Fork Breitenbush River 1709000502	Willamette	60,677	174	21	5	5	2	2	6	15	3	0	15	0	1
		Mt. Hood	7,294	6	5	0	0	0	0	0	0	0	0	0	0	0
		Non-FS or BLM	1,417	4	0											
		TOTAL	69,388	184	26											
	Detroit Reservoir / Blow Out Divide Creek 1709000503	Willamette	52,233	227	10	5	5	2	1	6	2	3	0	15	0	0
		Non-FS or BLM	19,202	97	2											
		TOTAL	71,435	324	12											
	Middle North Santiam River 1709000504	Willamette	552	5	0	0	0	0	0	0	0	0	0	0	0	0
		Salem	6,179	41	3	1	1	0	0	1	0	0	0	3	0	0
		Non-FS or BLM	49,924	421	2											
		TOTAL	56,655	467	5											
	Little North Santiam River 1709000505	Willamette	36,093	43	32	3	3	1	3	0	2	3	0	9	0	0
		Salem	13,160	79	1	1	1	0	0	2	8	0	0	3	0	0
		Non-FS or BLM	23,108	201	1											
		TOTAL	72,361	323	34											
South Santiam	Hamilton Creek / South Santiam River 1709000608	Salem	4,819	38	0	0	0	0	0	0	0	0	0	0	0	0
		Non-FS or BLM	113,279	762	22											
		TOTAL	118,099	800	22											
	Crabtree Creek 1709000606	Salem	17,594	135	0	1	1	0	0	0	0	0	0	3	0	0
		Non-FS or BLM	82,385	498	1											
		TOTAL	99,979	633	1											
	Thomas Creek 1709000607	Willamette	342	0	0	0	0	0	0	0	0	0	0	0	0	0
		Salem	12,952	100	0	1	1	0	0	0	3	0	0	3	0	0
		Non-FS or BLM	79,245	553	4											
		TOTAL	92,539	653	4											
	Quartzville Creek 1709000602	Willamette	35,521	144	10	0	0	0	0	0	6	0	0	0	0	0
		Salem	30,253	193	1	6	6	0	0	40	0	0	0	18	0	0
		Non-FS or BLM	43,633	338	19											
		TOTAL	109,407	675	30											
	Middle Santiam River 1709000601	Willamette	42,903	93	41	0	0	0	1	0	1	0	0	0	0	0
		Non-FS or BLM	23,771	218	6											
		TOTAL	66,674	311	47											
	South Santiam River 1709000603	Willamette	67,933	243	39	5	5	2	3	3	50	12	0	15	0	0
		Non-FS or BLM	33,776	293	6											
		TOTAL	101,709	536	45											
	South Santiam River/Foster Res 1709000604	Willamette	17	0	0	0	0	0	0	0	0	0	0	0	0	0
		Salem	434	0	0	0	0	0	0	0	0	0	0	0	0	0
		Non-FS or BLM	36,196	287	39											
		TOTAL	36,646	287	39											
	Wiley Creek 1709000605	Willamette	2,980	3	1	0	0	0	0	0	3	0	0	0	0	0
		Eugene	97	0	0	0	0	0	0	1	0	0	0	0	0	1
		Non-FS or BLM	37,575	244	20											
		TOTAL	40,651	247	21											
Middle Willamette	Rickreall Creek 1709000702	Siuslaw	1,030	8	0	0	0	0	0	0	0	0	0	0	0	0
		Salem	3,308	20	0	1	1	0	0	0	0	0	0	3	0	0
		Non-FS or BLM	119,510	641	7											
		TOTAL	123,848	669	7											

Appendix G. Projected BLM/FS LAA programmatic activities. Willamette Province. Annual Average Estimate (FY 2008-2012) by 5th Field Watershed (continued).

		Baseline Data					Activity Levels									
Subasin	5ths	Owner	Extent (Acres)	Total Roads (Miles)	Trails (Miles)	Estimated Miles of Roads within 150 ft of Streams with ESA listed fish (Willamette) and EFH (Coast)	Road Maintenance and Storm Proofing	Repair Storm Damage Roads	Recreation Site, Trail, and Admin Structure Maintenance		Fish Programs	Envirnonmental Ed	Pump Chance / Helipond Maintenance or Use	Roadside Hazard Trees	Commercial Rafting Permits	Telephone Line, Power Line Renewal Permits and ROW Renewals
							Road Miles	Miles	Trail Miles	Number of Campgrounds or Dispersed Sites	Stream Miles	Number of Visits	Quantity	Acres	Quantity	Quantity
Willamette Province																
Yamhill	Upper South Yamhill River 1709000801	Siuslaw	5,515	42	0	1	1	1	0	0	0	0	0	1	0	0
		Salem	11,376	24	0	0	0	0	0	0	0	0	0	0	0	2
		Non-FS or BLM	72,519	495	20											
		TOTAL	89,410	561	20											
	Willamina Creek 1709000802	Siuslaw	988	7	0	0	0	0	0	0	0	0	0	0	0	0
		Salem	16,967	117	0	2	2	2	1	1	3	5	2	6	0	1
		Non-FS or BLM	35,782	277	0											
		TOTAL	53,737	401	0											
	Mill Creek/South Yamhill River 1709000803	Siuslaw	115	1	0	0	0	0	0	0	0	0	0	0	0	0
		Salem	12,332	76	0	1	1	1	0	1	0	0	0	3	0	1
		Non-FS or BLM	21,751	120	0											
		TOTAL	34,198	197	0											
	North Yamhill River 1709000806	Salem	12,477	78	0	1	1	2	1	1	1	0	2	3	0	1
		Non-FS or BLM	100,974	712	7											
		TOTAL	113,451	790	7											
Molalla/Pudding	Butte Creek / Pudding River 1709000902	Salem	3,815	21	0	1	1	0	0	0	0	0	0	3	0	0
		Non-FS or BLM	66,615	417	0											
		TOTAL	70,431	438	0											
	Upper Molalla River 1709000905	Mt. Hood	1,731	6	0	0	0	0	0	0	0	0	0	0	0	0
		Willamette	555	0	0	0	0	0	0	0	0	0	0	0	0	0
		Salem	35,110	264	0	12	12	0	1	17	1	0	0	36	0	0
		Non-FS or BLM	91,809	745	7											
		TOTAL	129,205	1,015	7											
Tualatin	Dairy Creek 1709001001	Salem	6,581	32	0	1	1	1	0	0	1	0	2	3	0	1
		Non-FS or BLM	141,188	917	40											
		TOTAL	147,769	949	40											
	Scoggins Creek 1709001003	Salem	3,937	7	1	1	1	0	0	0	1	0	2	3	0	1
		Non-FS or BLM	83,023	440	31											
		TOTAL	86,961	447	32											
Lower Willamette	Collawash River 1709001101	Mt. Hood	93,160	370	18	6	8	2	1	10	10	1	2	24	0	0
		Willamette	3,283	8	5	0	0	0	0	0	0	0	0	0	0	0
		Salem	903	6	0	0	0	0	0	0	0	0	0	0	0	0
		Non-FS or BLM	34	0	0											
		TOTAL	97,380	384	23											
	Upper Clackamas River 1709001102	Mt. Hood	94,203	488	3	8	7	2	2	20	12	1	5	21	0	0
		Non-FS or BLM	6,251	12	7											
		TOTAL	100,454	500	10											
	Oak Grove Fork Clackamas River 1709001103	Mt. Hood	77,760	440	12	1	1	1	1	20	12	1	2	3	0	0
		Non-FS or BLM	12,743	43	3											
		TOTAL	90,504	483	15											
	Middle Clackamas River 1709001104	Mt. Hood	126,164	506	0	2	3	2	8	40	16	20	2	9	17	0
		Salem	3,498	26	0	0	0	0	0	0	0	0	0	0	0	0
		Non-FS or BLM	8,785	91	4											
		TOTAL	138,447	623	4											
	Eagle Creek 1709001105	Mt. Hood	17,247	32	0	0	1	1	0	2	8	0	1	3	0	0
		Salem	4,076	13	0	1	1	0	0	0	10	0	0	3	0	0
		Non-FS or BLM	36,264	281	3											
		TOTAL	57,587	326	3											
	Lower Clackamas River 1709001106	Mt. Hood	1,732	13	0	0	0	0	0	0	0	0	0	0	0	0
		Salem	4,977	32	0	1	1	0	0	0	0	0	0	3	0	0
		Non-FS or BLM	110,902	899	0											
		TOTAL	117,611	944	0											
	Scappoose Creek 1709001202	Salem	6,436	31	0	2	2	1	0	0	1	0	3	6	0	1
		Non-FS or BLM	116,629	949	4											
		TOTAL	123,064	980	4											

Appendix H. Projected BLM/FS LAA programmatic activities. North Coast Province. Annual Average Estimate (FY 2008-2012) by 5th Field Watershed.

			Baseline Data				Activity Levels									
Subbasin	5ths	Owner	Extent (Acres)	Total Roads (Miles)	Trails (Miles)	Estimated Miles of Roads within 150 ft of Streams with ESA listed fish (Willamette) and EFH (Coast)	Road Maintenance and Storm Proofing	Repair Storm Damage Roads	Recreation Site, Trail, and Admin Structure Maintenance		Fish Programs	Environment al Ed	Pump Chance / Helipond Maintenance or Use	Roadside Hazard Trees	Commercial Rafting Permits	Telephone Line, Power Line Renewal Permits and ROW Renewals
							Road Miles	Miles	Trail Miles	Number of Campgrounds or Dispersed Sites	Stream Miles	Number of Visits	Quantity	Acres	Quantity	Quantity
North Coast Province																
Nehalem	Upper Nehalem River 1710020201	Salem	4,566	30	0	1	1	1	0	2	4	0	0	3	0	1
		Non-FS or BLM	137,936	902	58											
		TOTAL	142,502	932	58											
Wilson/Trask/Nestucca	Little Nestucca River 1710020301	Siuslaw	19,238	128	0	4	4	2	0	0	5	1	0	12	0	0
		Salem	183	1	0	0	0	0	0	0	0	0	0	0	0	0
		Non-FS or BLM	19,962	125	0											
		TOTAL	39,383	254	0											
	Nestucca River 1710020302	Siuslaw	69,441	257	0	5	5	2	1	3	5	3	0	15	0	0
		Salem	36,701	303	0	10	10	3	5	5	25	10	4	30	0	1
		Non-FS or BLM	58,508	434	0											
		TOTAL	164,650	994	0											
	Tillamook River 1710020303	Siuslaw	894	7	0	0	0	0	0	0	0	0	0	0	0	0
		Salem	288	1	0	0	0	0	0	0	0	1	0	0	0	1
		Non-FS or BLM	37,708	271	1											
		TOTAL	38,890	279	1											
	Trask River 1710020304	Salem	9,025	20	0	1	1	2	0	0	6	2	4	3	0	5
		Non-FS or BLM	102,766	606	16											
		TOTAL	111,792	626	16											
	Wilson River 1710020305	Salem	3,437	5	0	1	1	1	0	0	2	1	1	3	0	1
		Non-FS or BLM	119,449	602	63											
		TOTAL	122,886	607	63											
	Kilchis River 1710020306	Salem	2,937	11	0	1	1	1	0	0	1	0	1	3	0	1
		Non-FS or BLM	64,991	322	10											
		TOTAL	67,928	333	10											
	Spring Creek / Sand Lake / Neskowin Frontal 1710020309	Siuslaw	15,654	78	0	2	1	1	0	1	2	1	0	3	0	0
		Salem	95	0	0	0	0	0	0	0	0	0	0	0	0	1
		Non-FS or BLM	32,874	223	3											
		TOTAL	48,632	301	3											
Siletz/Yaquina	Big Elk Creek 1710020402	Siuslaw	16,222	77	0	2	2	1	0	5	2	0	0	6	0	1
		Salem	2,613	21	0	1	1	0	0	0	0	0	0	3	0	1
		Non-FS or BLM	37,980	223	0											
		TOTAL	56,814	321	0											
	Lower Yaquina River 1710020403	Siuslaw	3,601	14	0	1	1	1	0	0	0	0	0	3	0	1
		Salem	43	2	0	0	0	0	0	0	0	0	0	0	0	0
		Non-FS or BLM	46,975	223	22											
		TOTAL	50,619	239	22											
	Upper Siletz River 1710020404	Salem	12,580	74	0	1	1	0	1	0	0	0	0	3	0	1
		Non-FS or BLM	31,881	257	4											
		TOTAL	44,462	331	4											
	Salmon River / Siletz / Yaquina Bay 1710020408	Siuslaw	11,082	63	0	2	2	1	1	1	3	3	0	6	0	1
		Salem	2,981	21	0	0	0	0	0	0	0	0	0	0	0	1
		Non-FS or BLM	44,248	378	2											
		TOTAL	58,311	462	2											
	Lower Siletz 1710020407	Siuslaw	22,754	134	0	1	1	1	0	0	5	1	0	3	0	0
		Salem	2,928	17	0	1	1	0	0	0	0	0	0	3	0	1
		Non-FS or BLM	96,601	519	20											
		TOTAL	122,283	670	20											
	Devils Lake / Moolack Frontal 1710020410	Salem	64	3	0	1	1	0	0	0	0	0	0	3	0	0
		Non-FS or BLM	30,302	267	2											
		TOTAL	30,366	270	2											

Appendix H. Projected BLM/FS LAA programmatic activities. North Coast Province. Annual Average Estimate (FY 2008-2012) by 5th Field Watershed. (Continued)

Subbasin	5ths	Owner	Baseline Data: Extent (Acres)	Total Roads (Miles)	Trails (Miles)	Estimated Miles of Roads within 150 ft of Streams with ESA listed fish (Willamette) and EFH (Coast)	Activity Levels: Road Maintenance and Storm Proofing – Road Miles	Repair Storm Damage Roads – Miles	Recreation Site, Trail, and Admin Structure Maintenance – Trail Miles	Recreation Site, Trail, and Admin Structure Maintenance – Number of Campgrounds or Dispersed Sites	Fish Programs – Stream Miles	Environmental Ed – Number of Visits	Pump Chance / Helipond Maintenance or Use – Quantity	Roadside Hazard Trees – Acres	Commercial Rafting Permits – Quantity	Telephone Line, Power Line Renewal Permits and ROW Renewals – Quantity
North Coast Province																
Alsea	Upper Alsea River 1710020501	Siuslaw	1,019	7	0	0	0	0	0	0	1	1	1	0	0	1
		Salem	41,346	270	3	5	5	1	1	2	3	0	0	15	0	1
		Eugene	1,662	16	0	0	0	0	0	0	0	0	0	0	0	0
		Non-FS or BLM	37,237	378	3											
		TOTAL	81,263	671	6											
	Five Rivers / Lobster Creek 1710020502	Siuslaw	46,833	215	0	4	5	2	0	5	25	1	1	15	0	1
		Salem	13,461	84	0	6	6	1	0	0	3	0	0	18	0	1
		Eugene	1,317	10	0	0	0	0	0	0	0	0	0	0	0	0
		Non-FS or BLM	14,743	88	0											
		TOTAL	76,354	397	0											
	Drift Creek 1710020503	Siuslaw	28,452	90	0	6	6	2	1	0	10	1	1	18	0	1
		Salem	1,188	9	0	1	1	0	0	0	0	0	0	3	0	0
		Non-FS or BLM	14,656	97	0											
		TOTAL	44,297	196	0											
	Lower Alsea River 1710020504	Siuslaw	41,626	198	0	5	5	2	0	2	2	2	1	15	0	1
		Salem	13,103	102	0	4	4	1	0	1	3	1	0	12	0	1
		Non-FS or BLM	45,008	314	0											
		TOTAL	99,737	614	0											
	Beaver Creek / Waldport Bay 1710020505	Siuslaw	10,207	46	0	1	1	1	0	2	1	1	1	3	0	0
		Salem	349	0	0	0	0	0	0	0	0	0	0	0	0	0
		Non-FS or BLM	21,210	139	0											
		TOTAL	31,766	185	0											
	Yachats River 1710020506	Siuslaw	27,237	120	0	2	2	1	0	3	15	1	1	6	0	0
		Salem	265	2	0	0	0	0	0	0	0	0	0	0	0	0
		Non-FS or BLM	11,094	70	0											
		TOTAL	38,595	192	0											
	Cummins Creek / Tenmile Creek / Mercer Lake Frontal 1710020507	Siuslaw	53,615	172	15	1	2	2	2	4	25	1	1	6	0	0
		Eugene	322	0	0	0	0	0	0	0	0	0	0	0	0	0
		Non-FS or BLM	15,110	89	0											
		TOTAL	69,046	261	15											
Siuslaw	Upper Siuslaw River 1710020601	Eugene	56,283	367	0	42	42	3	1	13	20	26	0	15	0	2
		Non-FS or BLM	71,683	575	0											
		TOTAL	127,966	942	0											
	Wolf Creek 1710020602	Eugene	16,695	89	0	5	2	2	0	3	10	1	0	6	0	2
		Non-FS or BLM	21,199	213	0											
		TOTAL	37,895	302	0											
	Wildcat Creek 1710020603	Eugene	14,072	60	0	2	1	1	0	0	2	0	0	3	0	2
		Non-FS or BLM	20,781	143	0											
		TOTAL	34,853	203	0											
	Lake Creek 1710020604	Siuslaw	4,516	17	0	2	2	1	0	0	5	1	0	6	0	0
		Eugene	29,801	215	2	8	12	2	2	12	5	25	0	10	0	2
		Non-FS or BLM	40,108	223	3											
		TOTAL	74,425	455	5											
	Deadwood Creek 1710020605	Siuslaw	24,652	89	0	1	1	2	0	0	20	5	0	6	0	2
		Eugene	5,753	14	0	0	1	1	0	0	3	0	0	2	0	1
		Non-FS or BLM	7,179	41	0											
		TOTAL	37,585	144	0											
	Indian Creek/Lake Creek 1710020606	Siuslaw	25,405	97	2	1	2	2	0	5	20	1	1	6	0	1
		Non-FS or BLM	5,377	23	0											
		TOTAL	30,782	120	2											
	North Fork Siuslaw River 1710020607	Siuslaw	31,820	123	2	1	2	2	2	15	30	10	1	6	0	1
		Eugene	75	0	0	0	0	0	0	0	0	0	0	0	0	0
		Non-FS or BLM	10,305	45	1											
		TOTAL	42,200	168	3											
	Lower Siuslaw River 1710020608	Siuslaw	43,384	127	3	3	3	2	2	2	35	40	1	9	0	1
		Eugene	5,485	22	0	1	2	1	0	0	2	0	0	1	0	1
		Non-FS or BLM	61,632	310	1											
		TOTAL	110,501	459	4											
Siltcoos	Waohink River / Siltcoos River / Tahkenitch Lake Frontal 1710020701	Siuslaw	33,176	100	12	0	1	1	0	0	25	10	1	3	0	1
		Other Fed	1,152	4	0											
		Non-FS or BLM	49,126	199	6											
		TOTAL	83,454	303	18											

Appendix I. Projected BLM/FS LAA programmatic activities in watersheds with bull trout. Willamette/Deschutes Provinces. Annual Average Estimate (FY 2008-2012) by 5th Field Watershed.

		Baseline Data					Activity Levels									
Subbasin	5ths	Owner	Extent (Acres)	Total Roads (Miles)	Trails (Miles)	Estimated Miles of Roads within 150 ft of Streams with Bull Trout	Road Maintenance and Storm Proofing	Repair Storm Damage Roads	Recreation Site, Trail, and Admin Structure Maintenance		Fish Programs	Envirnonmental Ed	Pump Chance / Helipond Maintenance or Use	Roadside Hazard Trees	Commercial Rafting Permits	Telephone Line, Power Line Renewal Permits and ROW Renewals
							Road Miles	Miles	Trail Miles	Number of Campgrounds or Dispersed Sites	Stream Miles	Number of Visits	Quantity	Acres	Quantity	Quantity
Willamette/Deschutes Province																
Middle Columbia/Hood	East Fork Hood River 1707010506	Mt. Hood	70,560	207	87	4	4	4	1	1	25	1	0	12	0	1
		Other Fed	200	0	0											
		Non-FS or BLM	30,047	223	2											
		TOTAL	100,807	430	89											
Middle Fork Willamette	Upper Middle Fork Willamette River 1709000101	Willamette	101,980	470	32	2	2	1	7	2	27	10	0	6	0	0
		Non-FS or BLM	11,571	62	0											
		TOTAL	113,551	532	32											
	Hills Creek 1709000102	Willamette	36,304	204	5	2	2	1	0	1	0	0	0	6	0	0
		Non-FS or BLM	2,124	12	0											
		TOTAL	38,428	216	5											
	Salmon Creek 1709000104	Willamette	80,382	319	43	0	0	0	0	4	0	0	0	0	0	0
		Non-FS or BLM	2,014	22	1											
		TOTAL	82,396	341	44											
	Hills Creek Reservoir 1709000105	Willamette	87,741	484	16	19	19	5	6	0	20	10	0	57	0	0
		Other Fed	676	4	0											
		Non-FS or BLM	21,447	133	2											
		TOTAL	109,865	621	18											
McKenzie	Upper Mckenzie River 1709000401	Willamette	222,682	541	219	4	4	1	10	5	80	10	0	12	50	0
		Non-FS or BLM	7,845	124	3											
		TOTAL	230,527	665	222											
	Horse Creek 1709000402	Willamette	100,061	77	119	1	1	1	0	1	7	0	0	3	0	0
		Non-FS or BLM	1,705	9	0											
		TOTAL	101,767	86	119											
	South Fork Mckenzie River 1709000403	Willamette	128,930	263	154	15	15	4	1	9	13	0	0	45	12	0
		Non-FS or BLM	8,980	53	4											
		TOTAL	137,910	316	158											
	Blue River 1709000404	Willamette	52,437	237	16	0	0	0	0	0	3	0	0	0	0	0
		Non-FS or BLM	6,548	35	5											
		TOTAL	58,986	272	21											
	Mckenzie River/Quartz Creek 1709000405	Willamette	21,813	118	2	2	2	1	0	0	10	0	0	6	50	0
		Non-FS or BLM	25,894	151	0											
		TOTAL	47,707	269	2											
	Lower Mckenzie River 1709000407	Willamette	7,126	14	0	0	0	0	0	0	0	0	0	0	0	0
		Eugene	25,377	117	0	0	0	0	0	3	0	0	0	0	0	0
		Non-FS or BLM	132,377	946	2											
		TOTAL	164,879	1,077	2											

Appendix J. Project Pre-Notification Form

Project Notification

	(check appropriate)
ARBO - Aquatic Restoration Biological Opinion	
NWOR - General Programmatic Activities	x

Date Submitted:

										ARBO Only	
Agency Name (Forest/District) (District/Resource Area)	Location (name and HUC #) ARBO - 6th field HUC NWOR - 5th field HUC	Timing (Start & End Dates)	Activity Type ARBO - Category # and name) NWOR - Category Name (Incl. all that apply)	Project Description ARBO - brief narrative of project and objectives NWOR - campground name, facility name, etc.	Extent ARBO - stream name and miles/ac treated NWOR - miles, sites, etc.	Species Affected (all species and CH affected)	NEPA Document Name/# (if applicable)	Comment	Fish Handling	Authorized Incidental Take	Any required monitoring results